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Fish Populations of Carnation Creek 1987-1990

Bruce C. Andersen and J. Charles Scrivener

Department of Fisheries and Oceans
Biological Sciences Branch
Pacific Biological Station
Nanaimo, British Columbia V9R 5K6

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Department of Fisheries and Oceans
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ABSTRACT

Andersen,B.C. and J.C.Scrivener. Fish populations of Carnation Creek 1987-1990. Can. Data Rep. Fish. Aquat. Sci. 890: 88p.

This report presents a summary of fish population data collected as part of the Carnation Creek Experimental Watershed Project. The time period covered is from January 1987 to December 1990.

Key words: Watershed study, coho, chum, steelhead, cutthroat, sculpin, logging, Carnation Creek

RÉSUMÉ

Andersen,B.C. and J.C.Scrivener. Fish populations of Carnation Creek 1987-1990. Can. Data Rep. Fish. Aquat. Sci. 890: 88p.

On présente un résumé des données sur les populations de poisson recueillies de je janvier 1987 á décembre 1990 dans le cadre du "Carnation Creek Experimental Watershed Project".

Mots-clés: étude de bassin versant, coho, kéta, truite arc-en-ciel anadrome, truite fardée, chabot, exploitation des forêts, ruisseau Carnation

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INTRODUCTION

The Carnation Creek Experimental Watershed Project was begun during 1970 with initiation of pre-logging studies (Narver and Chamberlin 1976). Road construction was begun January 10, 1975 and logging started in the autumn of 1975. Other than spurs and landings, road construction was completed by March 1978 and logging was completed in June 1981 (Fig. 1). A three year study on the effects of an aerial applied herbicide was started during September 1984. March 1986 marked the end of phase I of the project.

Phase II of the project was initiated during April 1986 when the level of field work was reduced and fish data collection was continued by contract. In 1987, road construction and logging was begun at the higher elevations of the watershed (above E weir; Fig. 1).

In June 1990 the Department of Fisheries and Oceans withdrew as an active participant in the project. The study is continuing under the direction of the B.C.Ministry of Forests,Research Branch.

This report is one in a series on populations of chum salmon (*Oncorhynchus keta*), coho salmon (*O. kisutch*), steelhead trout (*O. mykiss*), cutthroat trout (*O. clarki*), prickley sculpin (*Cottus asper*), and coast range sculpin (*C. aleuticus*) in Carnation Creek and other Barkley Sound streams (Andersen 1983, 1984,1985,1987). This report covers the period from January 1887 to December 1990. Some data from this period has been used for population models (Scrivener 1991), for project summaries (Hartman and Scrivener 1990), and for behaviour studies (McMahon and Holtby 1992).

METHODS

The basic rational for the project, study sites (Fig. 1), and methods used for individual component studies have been described by Andersen (1983) and by Hartman and Scrivener (1990). For the first time, data from the winter population and chum salmon emergence studies are included in this report series.

WINTER POPULATION ESTIMATES

In late January to early February estimates of populations of fish inhabiting seasonally flooded land (Fig. 2) on the Carnation Creek flood plain were obtained using a mark-recapture method. Calculation of the estimates used the formula $N=(M+1)(C+1)/(R+1)$ where N is the estimate of population size, M is the number of fish marked, C is total catch at recapture, and R is the number of marked fish recaptured.

Baited minnow traps were used to capture fish for marking, and to recapture fish 2 to 4 days after release. Fish were marked by a

cold branding technique using an acetone-dry ice coolant for the silver tipped branding tool. A different mark was used at each study site. The lengths of nearly all fish were measured and fish in subsamples were weighed. Scales were taken and examined to obtain age distributions of fish in the populations. Detailed descriptions of the winter population study sites and techniques are in Brown (1987).

CHUM SALMON EMERGENCE

As part of incubation and emergence studies chum salmon fry were trapped as they left the gravel. In late February, 20 to 30 emergence traps, each covering an area of 0.56 m^2, were placed over spawning areas in close proximity to gravel sampling sites in study section I. The traps were checked daily and emerging fry were counted, measured(FL), weighed, and released. During June, the traps were removed from the stream.

RESULTS

ADULT STUDIES

Coho Salmon

During 1987-1990 the returns and mean lengths of adult coho were within the range of previous years. A summary of adult coho escapements and mean fork lengths (FL) is shown in appendix table a-1 for all years of the project (1971-90).

The age compositions of adult coho salmon populations for 1987 to 1990 are given in Table 1. Length distributions by ocean age and sex are given in Table 3.

Adult coho entered Carnation Creek during October 1-November 10 (Table 2). As in previous years their entry coincided with autumn floods (Andersen 1983). In all four years 95% of the coho had passed the counting fence by early November.

Chum Salmon

The estimates of chum salmon spawning escapements (above and below fence) were: 1987 325; 1988 1500; 1989 180; 1990 100. The 1989 and 1990 counts were the lowest recorded for this study. A summary of adult chum escapements for all years (1970-90) is given in appendix table a-2.

Weekly counts of chum salmon, by sex, passing the Carnation Creek fence 1987-90 are in Table 4.

The 21 year average of yearly means (1970-90) was 72.3 cm.for male chum salmon and 69.6 cm. for females. The mean lengths of males and females were above the 21 year average for 1989 and below the average for 1987, 1988, and 1990 (Table 5).

The dominant age group of chum adults continued to be three winters in the ocean as determined from otoliths (Table 6).

Steelhead and Cutthroat Trout

1987

On January 16 one large and one jack steelhead were observed downstream of the fence. In early March one large steelhead was observed below the fence. On April 10 and 11 a female and a jack steelhead were observed spawning 40 metres downstream of the fence.

No cutthroat trout were caught or observed in 1987.

1988

On March 29 and 31 two steelhead kelts migrating downstream were caught at the fence. Both were females (FL = 62cm, age 3.1 ; FL = 81cm, age _.2) in good condition and they were released downstream after being measured and scales taken.

On April 8 a new redd was observed downstream of the fence. Given the time of the year, this redd was most likely made by a steelhead.

One spent male sea-run cutthroat trout (FL = 29.5cm, age 2.1) was caught on May 20 at the fence. On September 28 a male cutthroat trout (FL = 27cm, age 1.1) was caught migrating upstream at the fence.

1989

On March 18 a male steelhead kelt (FL = 83cm, age 2.3) and on June 20 a female steelhead kelt (FL = 66cm, age 3.2) were caught at the fence.

No sea-run cutthroat trout were caught or observed in 1989.

1990

No steelhead or sea-run cutthroat trout were caught or observed in 1990.

In all four years, high steam discharges flooded out the fence for short periods while it was fishing for downstream migrants (March to August). During these floods adult fish could have passed the fence unobserved.

Other Salmon

In November 1987 two sockeye salmon (*O. nerka*) were observed downstream of the fence. On November 11 and 12, 1989 a female sockeye, attended by a large male and two jack sockeye, was observed constructing a redd 60 metres downstream of the fence. In 1990 two male sockeye (55 and 53 cm.) were passed through the fence.

No pink salmon (*O. gorbuscha*) were observed in Carnation Creek in 1987-1990.

Two male chinook salmon (*O. tshawytscha*; 49 and 78 cm) were passed through the fence in 1990. None were observed during 1987-1989.

JUVENILE AND RESIDENT STUDIES

The basic data on length, length-weight, condition factor, population, density, and biomass for juvenile and resident fish are in the appendices.

Downstream Migrants

Daily outmigrations of cottids and juvenile salmonids are presented in appendices I-IV. Total counts for 1987-1990 are summarized in Table 7.

Coho Salmon

The numbers of age I+ coho smolts in the 1987-1990 migrations were within the range of previous post logging migrations. The number of 1988 age II+ coho smolts was the lowest recorded during the project. A summary of juvenile coho outmigration for all years studied (1971-90) is given in appendix table a-3.

The coho smolt migration in 1987-90 continued the post logging trend of being earlier than in the prelogging period (Table 8).

The mean lengths of age I+ coho smolts in 1987-90 were within the range of previous post logging mean lengths. To date, the largest age II+ smolts were obtained during 1987.

The number of coho fry in the downstream migrations were within the range of previous post logging numbers. The timing of the migrations (Table 8) were similar to that of previous years.

Chum Salmon

The 1989 outmigration of chum salmon fry from above the fence was near the 19 year mean of 29124 fry, while the numbers in 1987, 1988, and 1990 were less than one third of the mean.

Timing of chum salmon fry runs are in Table 8. Chum fry emergence data are in Table 12 and appendices XXI and XXVII. In 1988 time of chum fry emergence below the fence was earlier than migration of fry through the fence. In 1989 below fence emergence and migration through the fence occurred at the same time.

Steelhead and Cutthroat Trout

Age compositions and mean lengths of juvenile steelhead and cutthroat in the downstream migrations are in Table 9. Timing of the juvenile steelhead runs are in Table 8. A summary of the

downstream migration of steelhead and cutthroat juveniles for all years (1971-1990) is in appendix table a-4.

Timing and numbers of juvenile steelhead in the run are within the range of previous years. The 1988 mean length of ≥100mm steelhead was the smallest of all years in this study.

Resident Fish

The late summer populations and densities of salmonids and cottids for the lower 3070m of Carnation Creek are in Tables 10 and 11. Summaries for all years of the project (1970-89) are in appendix tables a-5 and a-6.

The 1987-89 late summer population estimates for age 0 and I coho are within the range of previous post logging estimates. Numbers of steelhead (rainbow trout) and sculpins continued to be at the low end of the range of population estimates.

All fish data for upper Carnation Creek and tributary "C" can be found in appendix tables X-XII, XVI-XIX, and XXII-XXV.

Winter population study data are in appendix tables XIII-XV, XX, and XXVI. The data from winter population studies shows that juvenile salmonids made extensive use of off channel habitat.

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TABLE 1. Age composition of adult coho salmon in Carnation Creek in 1987,1988,1989,1990.

		Total age						Fresh water			Ocean		
		1.+	2.+	Tot	1.1+	2.1+	Tot	1.	2.	Tot	.+	.1+	Tot
1987													
M	n	41	3	44	34	1	35	75	4	79	58	38	96
	%	93.2	6.8		97.1	2.9		94.9	5.1		60.4	39.6	
F	n	0	0	0	23	1	24	23	1	24	0	26	26
	%				95.8	4.2		95.8	4.2		0	100	
Tot	n	41	3	44	57	2	59	98	5	103	58	64	122
	%	93.2	6.8		96.6	3.4		95.1	4.9		47.5	52.5	
1988													
M	n	92	5	97	30	3	33	122	8	130	98	34	132
	%	94.8	5.2		90.9	9.1		93.8	6.2		74.2	25.8	
F	n	0	0	0	20	1	21	20	1	21	0	23	23
	%				95.2	4.8		95.2	4.8		0	100	
Tot	n	92	5	97	50	4	54	142	9	151	98	57	155
	%	94.8	5.2		92.6	7.4		94.0	6.0		63.2	36.8	
1989													
M	n	129	18	147	83	2	85	212	20	232	152	89	241
	%	87.8	12.2		97.6	2.4		91.4	8.6		63.1	36.9	
F	n	0	0	0	53	5	58	53	5	58	0	60	60
	%				91.4	8.6		91.4	8.6		0	100	
Tot	n	129	18	147	136	7	143	265	25	290	152	149	301
	%	87.8	12.2		95.1	4.9		91.4	8.6		50.5	49.5	
1990													
M	n	102	18	120	72	11	83	174	29	203	121	89	210
	%	85.0	15.0		86.7	13.3		85.7	14.3		57.6	42.4	
F	n	0	0	0	88	5	93	88	5	93	0	97	97
	%				94.6	5.4		94.6	5.4		0	100	
Tot	n	102	18	120	160	16	176	262	34	296	121	186	307
	%	85.0	15.0		90.9	9.1		88.5	11.5		39.4	60.6	

Note: Differences in total freshwater and ocean numbers is due to some scales being unreadable in the freshwater zone.

TABLE 2. Weekly fence count of coho salmon into Carnation Creek by ocean age and sex 1987, 1988, 1989, 1990.

DATE	Female n	Male(.1+) n	Jack(.+) n	Total n	Accum %
1987 Oct 31	7	12	25	44	36.1
Nov 01-07	3	8	18	29	59.8
08-14	16	15	13	44	95.9
15-21	0	0	0	0	
22-28	0	3	1	4	99.2
Dec 06	0	0	1	1	100.0
Total	26	38	58	122	
1988 Sep 26-O1	0	0	20	20	12.9
Oct 02-08	0	0	5	5	16.1
09-15	2	3	15	20	29.0
16-22	2	4	16	22	43.2
23-29	0	0	4	4	45.8
30-N5	19	26	36	81	98.1
Nov 06	0	1	2	3	100.0
Total	23	34	98	155	
1989 Oct 12-14	2	7	38	47	15.6
15-21	14	23	61	98	48.2
22-28	16	26	22	64	69.4
29-N4	6	10	12	28	78.7
Nov 05-11	19	19	18	56	97.3
12-18	1	2	1	4	98.7
21	1	0	0	1	99.0
Dec 04	1	1	0	2	99.7
11	0	1	0	1	100.0
Total	60	89	152	301	
1990 Oct 04-06	7	19	56	82	26.7
07-13	12	11	24	47	42.0
14-20	3	0	4	7	44.3
21-27	42	37	19	98	76.2
28-N3	9	8	14	31	86.3
Nov 04-10	24	13	4	41	99.7
26	0	1	0	1	100.0
Total	97	89	121	307	

Notes:

On Oct 13 1988 a dead female (71cm, age 1.1) was found in trap. This fish is included in all counts.

In 1989 a female(69cm,age 2.1),counted on Oct 30,was found dead and unspawned. This fish is included in all counts.

On Nov 9 1989 coho were observed going over the fence during a flood. An estimated 5% should be added to the 1989 run to allow for these unsampled fish.

On Nov 10-11 1990 coho were observed going over the fence during a flood. An estimated 5% should be added to the 1990 run to allow for these unsampled fish.

TABLE 3. Length frequency and mean length of adult coho salmon in Carnation Creek by ocean age and sex 1987,1988,1989,1990.

Fork len.	Jack (.+)				Fork len.	Large Male (.1+)				Females (.1+)			
cm.	87	88	89	90	cm.	87	88	89	90	87	88	89	90
21		1			36			1	1				
22					37			1	1				
23					38			1	1				
24		2			39								
25	1	1	2		40			2					
26			2	3	41			1	1				
27	1	1	3	3	42			2	1				
28		3	3	3	43		1	1				1	
29		6	6	1	44				4				
30	2	8	9	12	45	1	1	2	2			1	
31	3	10	13	9	46		1	4	3				
32	7	14	17	13	47	1		1	4				
33	4	18	16	10	48	2	1	2	2				
34	7	17	14	13	49	1		6	3				
35	6	9	18	9	50	1		5	2	1		1	
36	7	5	14	18	51	2	2		4	1		1	
37	3	2	11	8	52	2		2	4	1			1
38	5	1	9	4	53	2	2	1	3			1	1
39	3		6	5	54	2	4	3	3	2			2
40	2		4	4	55			5	4				
41	1		3	4	56	1		5	2	1			
42					57	2	4	4	2			1	1
43			2	1	58	2	1	2	2	1	1	2	3
44				1	59	2	1	4	1			2	3
					60	3	1	2	3		1	7	3
					61			12	3	2	1	5	5
					62	2	2	3	2			5	4
					63	3		3	4			3	10
					64		1	3	3	1	2	8	9
					65	2		3	6	3	1	2	5
					66	2	1	3	2			6	12
					67		2	2	2	1	3	3	6
					68		3	1	1	3	1	5	6
					69	1	3		1	4	2	3	8
					70	1	1		1	1	2	3	2
					71			1		2	1		3
					72				2	2	5		4
					73			1			1		2
					74	1	1		2				4
					75				1		1		1
					76				2				1
					77	1	1		1		1		1
					78				1				
					79				2				
					80								
					81	1							
n	52	98	152	121		38	34	89	89	26	23	60	97
$\bar{x}$	34.6	32.2	33.9	34.0		58.9	59.7	55.4	57.4	63.8	68.5	62.6	65.5

TABLE 4 Weekly count of adult chum salmon, by sex, passing Carnation Creek fence in 1987, 1988, 1989, 1990.

Date	Female n	Male n	Total n	accum %
1987 Oct 31	22	56	78	87.6
Nov 01-07	3	6	9	97.8
08-14	0	2	2	100.0
Total	25	64	89	
1988 Sep 26-01	1	0	1	0.5
Oct 02-08	1	2	3	1.8
09-15	13	31	44	22.0
16-22	23	46	69	53.7
23-29	19	42	61	81.7
30-N5	12	28	40	100.0
Total	69	149	218	
1989 Oct 12	1	1	2	14.3
15-21	1	4	5	50.0
22-28	1	4	5	85.7
29-N4	1	0	1	92.9
Nov 06	0	1	1	100.0
Total	4	10	14	
1990 Oct 25	0	1	1	100.0
Total	0	1	1	

Notes:

Most of the chum salmon were netted below the fence and released upstream of the fence.

1987

Two female chum (63 and 68cm) were partially spawned out when released above the fence.

Mean length of chum females released above the fence was 67.7cm when including partially spawned fish, or 67.9cm when partially spawned fish were not included.

1988

One of the 69 female chum counted at the fence was dead (64cm), and four (64, 65, 68, 70cm) were partially spawned out when released above the fence.

Mean length of chum females released above the fence was 67.2cm when including dead and partially spawned fish, or 67.3cm when they were not included.

1989

Mean length of chum females released above the fence was 68.25cm.

TABLE 5. Length frequency of adult chum salmon by sex in Carnation Creek 1987, 1988, 1989, 1990.

Fork len. (cm.)	Males				Females			
	1987	1988	1989	1990	1987	1988	1989	1990
54	1							
55					2			
56	1		1					
57					1	1		
58	3				2	1		1
59	4	2			2	1		1
60	2	1			4	3		1
61	4	4			4	7		
62	7	5			6	3	1	
63	10	4	1		10	6		2
64	10	6	2	1	5	14	1	1
65	10	10	1	2	9	10	3	3
66	10	9		1	3	18	2	1
67	10	8	3	2	10	15	6	
68	6	14	3	1	4	14	5	1
69	10	18			2	15	5	1
70	7	16	1		11	15	3	
71	4	9	1		6	13	7	
72	11	27	3		3	10	8	
73	6	16	4	1		5	3	
74	6	18	3		1	5	3	
75	2	19	2	1	1	1	5	
76	4	12	2				1	1
77	1	6	5		1			
78	5	9	2	1				
79	1	6	3			1	1	
80	1	6	5		1			
81	1	2	2					
82		2	1					
83		3	1					
84			2					
85		1	1					
n	137	233	49	10	88	158	54	13
$\bar{x}$	67.7	71.5	74.4	68.8	65.8	67.4	70.3	64.7

Note:
Samples are a combination of fish measured at the fence and fish measured when taking otoliths downstream of the fence.

TABLE 6. Fork length and age composition (otoliths) of chum salmon in Carnation Creek 1987, 1988, 1989, and 1990.

	Males											
Fork len.	1987			1988			1989			1990		
cm.	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.4
54	1											
55												
56												
57												
58	3											
59	3			1	1							
60	1											
61	1	1		1								
62	1	2		1	1							
63	4	1		1			1					
64	3	3		1	1		1	1				
65		4		2	1						2	
66		5		3	2						1	
67	2	4			5		1	1			2	
68		3		1	10		1	2			1	
69		4		1	2							
70	1	2		1	8			1				
71		4			3			1				
72		5		1	13			3				
73		3			7			4				
74		2			4			3			1	
75		1			10			1				
76		1	1		3			1			1	
77		1			4			3				
78		3			2			1				1
79		1			3	1		3				
80		1			1			3	1			
81								2				
82						1			1			
83												
84					1				2			
85								1				
n	20	51	1	14	82	2	4	31	4	0	8	1
$\bar{x}$	61.8	69.6	76.0	65.4	71.9	80.5	65.5	74.9	82.5		68.5	78.0
%	27.8	70.8	1.4	14.3	83.7	2.0	10.3	79.5	10.3	0.0	88.9	11.1

TABLE 6. Continued. Fork length and age composition of chum salmon in Carnation Creek 1987 to 1990.

	Females											
Fork len.	1987			1988			1989			1990		
cm.	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.4
55	2											
56												
57				1								
58	2									1		
59	1	1								1		
60	1	1		2						1		
61	2	2		1	2							
62	2	2			1							
63	3	4		2	2					2		
64		6		1	8		1				1	
65	1	3		1	2			2			3	
66	1	2		3	12			2			1	
67	1	4		2	6		3	3				
68		2		1	8		1	4			1	
69					13			5			1	
70		8			6			3				
71		4			10			6				
72		3			5			8				
73		1			2			3				
74		1			3			2	1			
75					1			3	1			
76								1			1	
77												
78												
79								1				
n	16	44	0	14	81	0	5	43	2	5	8	0
$\bar{x}$	61.1	66.8	-	63.8	68.1	-	66.6	70.7	74.5	60.6	67.3	-
%	26.7	73.3	-	14.7	85.3	-	10.0	86.0	4.0	38.5	61.5	-

TABLE 7. Summary of downstream counts of cottids and juvenile salmonids at the Carnation Creek fence 1987 to 1990.

Species	Age	1987	1988	1989	1990
Chum	Fry	4166	8712	28675	152
Coho	Fry	7952	3942	2528	3260
	I+(<60 mm)	1	1	2	4
	I+($\bar{>}$60 mm)	2408	2683	3580	3128
	II+	239	28	280	89
	Tot.I+($\bar{>}$60mm),II+	2647	2711	3860	3217
Steelhead	<100 mm	25	26	50	2
	$\bar{>}$100 mm	29	23	44	25
Cutthroat	<100 mm	42	13	30	1
	$\bar{>}$100 mm	22	19	22	29
C. asper		112	75	86	99
C. aleuticus		11	8	10	10
Sampling period		Mar 2-Jul 10	Mar 2-Aug 24	Mar 3-Aug 22	Feb 28-Jun 21

Notes:
1987 sculpin count ends June 17.
1988 sculpin count ends June 4.
1989 sculpin count ends May 31.
1990 sculpin count ends June 21.

TABLE 8. Dates when 25, 50, and 75% of the downstream migration of coho, chum, and steelhead occurred in 1987-1990.

Species	Accum.%	1987	1988	1989	1990
Coho smolts	25	April 16	April 16	April 25	April 13
	50	April 26	April 28	April 30	April 20
	75	May 01	May 08	May 06	April 25
Steelhead	25	April 27	April 17	April 14	April 17
($\bar{>}$100 mm)	50	May 04	May 04	April 26	April 20
	75	May 08	May 09	April 30	May 03
Coho fry	25	April 07	March 21	April 04	March 23
	50	April 07	March 23	April 10	March 30
	75	April 14	April 01	April 20	April 02
Chum fry	25	April 03	March 28	April 04	March 19
	50	April 08	April 01	April 12	March 20
	75	April 13	April 03	April 17	March 21

TABLE 9. Age composition and mean lengths of rainbow and cutthroat trout in the downstream migrations 1987-1990.

	Rainbow				Cuttroat			
Age	n	$\bar{x}$ (mm)	S.D.	Range (mm)	n	$\bar{x}$ (mm)	S.D.	Range (mm)
1987								
I	23	83.1	10.27	60-101	51	88.9	12.12	66-127
II(all)	23	150.0	11.97	126-171	12	136.7	15.73	108-158
II(≥100mm)	23	150.0	11.97	126-171	12	136.7	15.73	108-158
III	5	164.6	9.32	153-179	-	-	-	-
Tot.($\bar{>}$100mm)	29	150.8	15.75	101-179	22	123.5	19.51	100-158
1988								
I	34	92.3	10.77	75-112	22	100.7	19.14	68-140
II(all)	7	128.0	11.37	111-138	8	129.0	14.62	108-157
II(≥100mm)	7	128.0	11.37	111-138	8	129.0	14.62	108-157
III	5	177.4	9.96	164-187	1	163.0	-	-
Tot.($\bar{>}$100mm)	22	129.1	29.62	101-187	18	126.2	17.14	100-163
1989								
I	57	87.5	9.67	62-106	40	88.4	13.45	61-115
II(all)	32	145.8	23.40	97-182	11	130.6	24.29	107-195
II(≥100mm)	31	147.3	22.00	109-182	11	130.6	24.29	107-195
III	5	178.6	17.81	157-202	1	205.0	-	-
Tot.($\bar{>}$100mm)	43	143.8	28.38	100-202	22	122.9	27.91	100-205
1990								
I	2	90.5	0.50	90-91	9	114.8	9.59	99-130
II(all)	20	141.3	16.07	110-160	19	139.0	17.57	115-175
II(≥100mm)	20	141.3	16.07	110-160	19	139.0	17.57	115-175
III	5	169.2	7.70	161-181	2	184.0	4.00	180-188
Tot.($\bar{>}$100mm)	25	146.9	18.51	110-181	29	136.0	22.13	104-188

TABLE 10. Population estimates during late summer of coho salmon, rainbow and cutthroat trout, and Cottus aleuticus in the lower 3070m of Carnation Creek during 1987, 1988, and 1989.

	1987			1988			1989		
		95% CI			95% CI			95% CI	
Species	n	Low	Up	n	Low	Up	n	Low	Up
Coho									
0	6584	6548	6626	5107	5064	5150	7092	7057	7126
I	293	272	322	287	265	316	236	222	250
All	6877			5394			7328		
Rbt.									
0	107	107	107	1313	1234	1392	243	236	250
I	14	14	14	143	36	251	7	7	7
II	7	7	7						
III	7	7	7						
All	135			1456			250		
Cut.									
0	1081	1038	1123	14	14	14	69	42	90
I	107	100	114	29	-21	79	28	-21	76
II	36	21	50	14	14	14			
III				7	7	7			
All	1224			64			97		
C. Aleuticus									
All	351	222	479	646	287	1011	972	514	1431

TABLE 11. Late summer fish density (fish/sq.m.) by study section and species in lower Carnation Creek (3070m.) 1987-89.

Species	Age	Study section II	III	IV	V	VI	VIII	Combined
1987								
Coho	0	0.80	0.54	0.83	0.62	0.49	1.99	0.75
	I	0.05	0.05	0.01	0.02	0.04	0.10	0.03
Rainbow	0							0.01
	I							.002
	II							.001
	III							.001
Cuttroat	0							0.12
	I							0.01
	II							.004
	III							~.002
C.aleuticus	All	0.10	~.04	0.03	~.03	0.03	0.00	0.04
C.asper	All	~.04		.003				
1988								
Coho	0	0.27	0.35	1.03	0.32	0.30	0.72	0.48
	I	0.02	.004	0.06	0.06	0.02	0.00	0.03
Rainbow	0	0.00	0.00	0.05	0.37	0.30	0.16	0.12
	I	0.01	~.01	~.02	~.03	0.02	0.01	0.01
Cuttroat	0							.001
	I							.003
	II							.001
	III							.001
C.aleuticus	All	0.10	0.05	~.06	~.12	0.01	0.00	0.06
C.asper	All	~.03	0.01					
1989								
Coho	0	0.45	0.58	1.20	0.51	0.57	0.05	0.56
	I	0.05	.003	0.04	.004	~.02	0.00	0.02
Rainbow	I	0.01	.003	0.02	0.03	0.05	0.02	0.02
	II	0.00	0.00	0.00	.004	0.00	0.00	.001
Cuttroat	I							0.01
	II							.002
C.aleuticus	All	0.13	0.52	0.03	0.19	0.02	0.01	0.08
C.asper	All	0.04	0.01					

Note: The combined density is derived from areas and catches from all sections combined for population estimates.

TABLE 12. Emergence trap catches of chum salmon fry from the spawning area downstream of the counting fence 1988 - 1990.

Trap #	1	5	6	7	ALL
1988					
Feb 29		1			1
Mar 06			6		6
Mar 08			1		1
Mar 09			14		14
Mar 10		1	2		3
Mar 11			1		1
Mar 12			5		5
Mar 13	1		1		2
Mar 14		7	12		19
Mar 15		1	9		10
Mar 16	1	3	7		11
Mar 17		8	7		15
Mar 18		9	3		12
Mar 19	1	2	6		9
Mar 21	1	7		22	30
Mar 22	2	1	2	2	7
Mar 24	2		2	12	16
Mar 25			4		4
Mar 26	1		1	1	3
Total	9	40	83	37	169

TABLE 12. Continued. Emergence trap catches of chum fry.

Trap #	1	2	3	4	7	8	9	10	12	13	14	16	17	18	20	21	ALL
1989																	
Mar 02	1			1		1		1	1								5
Mar 12								5	3			1					9
Mar 16								9									9
Mar 17								8									8
Mar 18								9									9
Mar 20			6			1	6							1			14
Mar 21			3					9						10			22
Mar 22		1	180	2			3	28						1			215
Mar 23		13	77			1		12						3			106
Mar 24		28	16				1	4						12		2	63
Mar 25		77	9					5	1		1			4		1	98
Mar 26	2	5	2					5				1		3		1	19
Mar 27	1	24	41			1		5						3		5	80
Mar 28	1	41	26					2								3	73
Mar 29		8	17					1			1	41		2		4	74
Mar 30		1						1			6	2					10
Mar 31			3				9	7				20					39
Apr 01		13	2					1			10	9	9	2	2		48
Apr 02		24	2					3				8					37
Apr 03													1			2	3
Apr 04		2	13				9			10	1	5	19			1	60
Apr 05		41	3			1	8	2		4	1	6	11			11	88
Apr 06		9	7			1	1	2			4						24
Apr 07		121	2			1				2			9			1	136
Apr 08		12				1				1	4		1		1		20
Apr 09		3				1							1				5
Apr 10		1	2			4											7
Apr 11		20									5						25
Apr 13		2				3				1	2						8
Apr 14		5				1		8			1		2			1	18
Apr 15		6				4		6						1			17
Apr 16		2						4		1							7
Apr 17						10	1	3									14
Apr 18		2						2									4
Apr 20		2				5											7
Apr 22		4			11	1		1		3						1	21
Apr 23		63			2												65
Apr 24		34			2												36
Apr 25		11			2	1											14
Apr 26		19				1											20
Apr 27		6															6
Apr 28		8															8
Apr 29		3			1												4
Apr 30		4															4
May 02		2									3						5
May 06		3			7						1						11
May 07					1			1				1					3
May 13												5					5
Total	5	620	411	3	26	39	38	144	5	22	40	99	53	42	3	33	1583

TABLE 12. Continued. Emergence trap catches of chum salmon fry.

Trap #	1	3	8	11	12	14	17	ALL
1990								
Mar 02					1		1	2
Mar 03	1							1
Mar 05	12	3						15
Mar 09	2							2
Mar 10	6							6
Mar 30						1		1
Apr 10			5					5
Apr 11				5				5
Apr 16			2					2
Apr 17			3					3
Apr 18			2					2
Apr 22			1					1
Total	21	3	13	5	1	1	1	45

Note:
Total number of traps fished was 21 for 1988, 1989, and 1990.

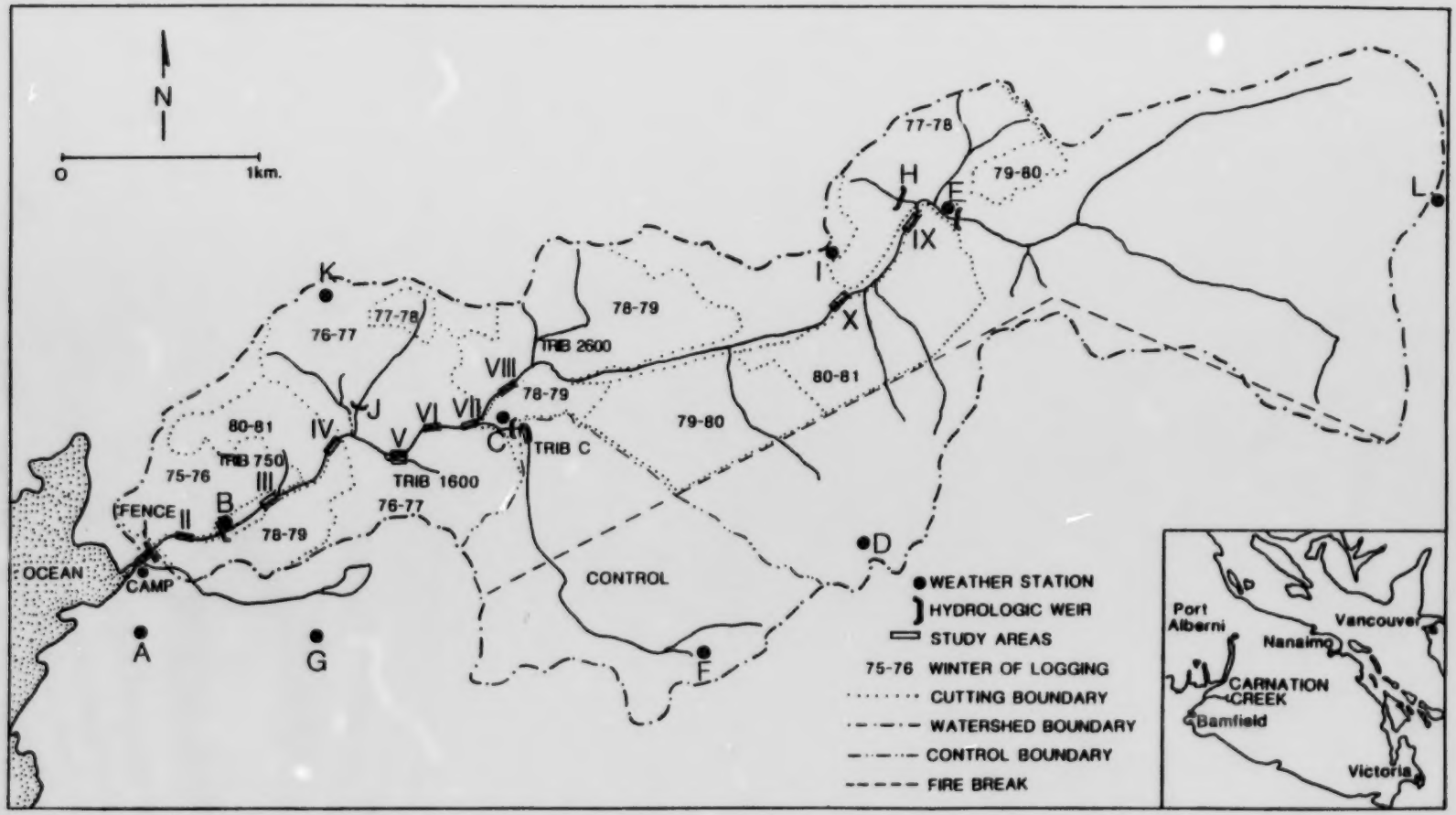

Fig. 1. Carnation Creek watershed showing the main channel and tributaries; location of hydro-meteorological stations, fish counting fence, stream study sections, and clearcuts.

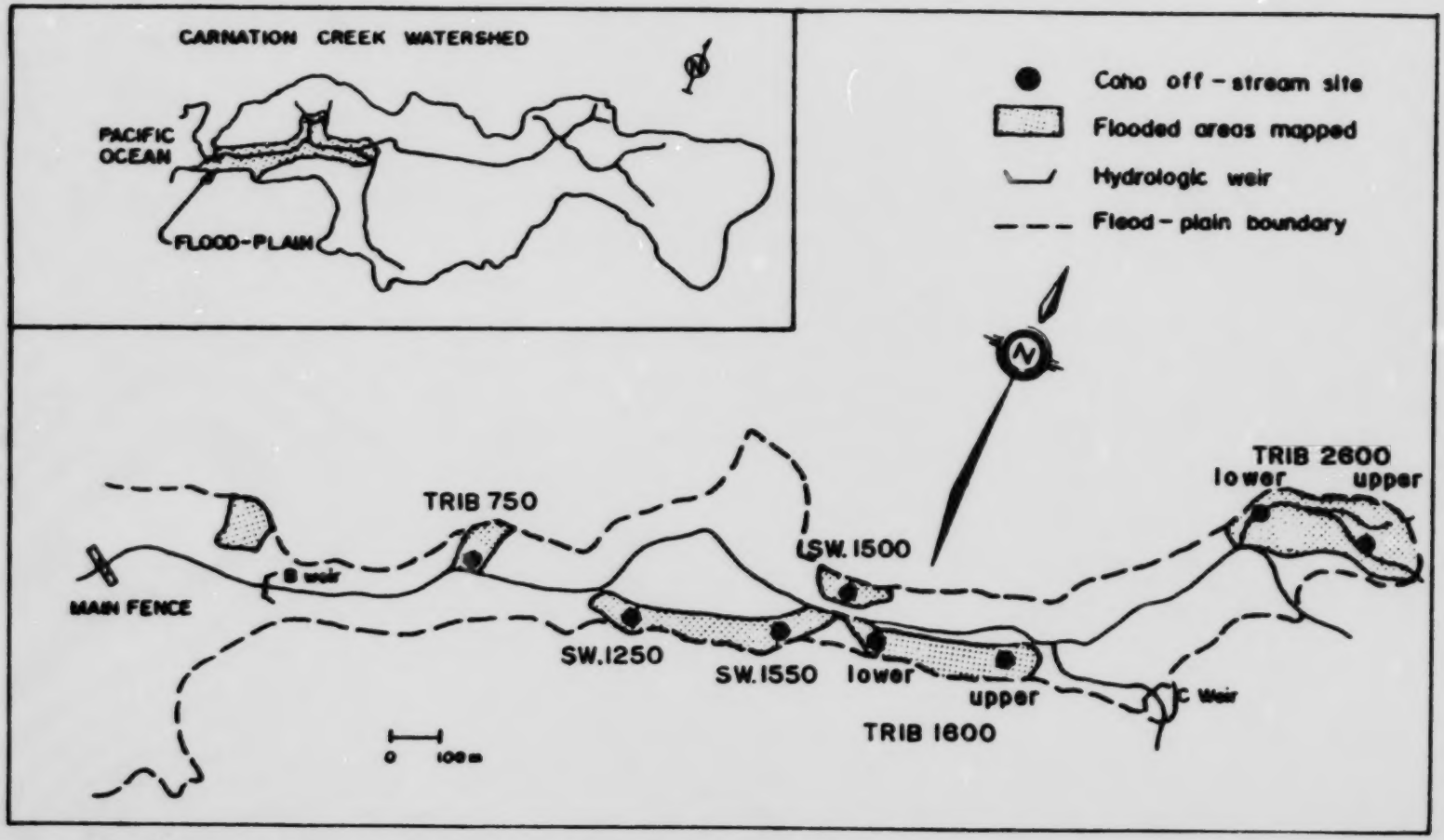

Fig. 2. Map of Carnation Creek flood-plain showing locations of tributaries, hydrographic weirs, fish counting fence, flooded areas mapped, and salmonid over-wintering sites (from Brown, 1987).

Appendix a-1. Summary of adult coho escapments 1971-1990.

	Jack(.+)		Large male(.1+)		Female		
Year	Return	Mean fork length (cm)	Return	Mean fork length (cm)	Return	Mean fork length (cm)	Total large
a1971	62	35.0	108	55.7	81	61.0	189
1972	76	33.0	87	65.2	75	68.6	162
1973	43	33.8	85	62.8	71	66.8	b 164
1974	75	35.6	88	58.1	70	66.9	c 159
1975	54	33.4	89	65.4	69	65.9	158
1976	35	30.1	68	56.1	55	63.5	123
1977	53	34.7	76	57.3	51	65.2	127
1978	233	33.5	46	60.7	56	65.3	102
1979	114	33.2	136	58.2	176	64.0	312
1980	101	34.8	110	57.0	65	66.8	d 175
1981	61	32.7	76	56.2	e 43	64.4	119
1982	61	34.7	103	55.6	71	64.4	174
1983	83	34.7	52	54.7	51	61.2	103
1984	25	30.4	27	54.1	f 22	63.9	49
1985	59	34.4	43	56.2	26	64.3	69
1986	27	33.6	64	55.2	55	63.5	g 119
1987	58	34.6	38	58.9	26	63.8	64
1988	98	32.2	34	59.7	h 23	68.5	57
1989	152	33.9	89	55.4	i 60	62.6	j 149
1990	121	34.0	89	57.4	97	65.5	k 186
Mean	79.5		75.4		62.1		138.0

a-1971 run estimated using mark and recovery.
b-eight large coho not sexed but included in total.
c-includes one large unsampled coho.
d-add 5-10% to total to allow for fish not sampled due to a flood.
e-five of these females were used for an egg take.
f-one of these females found dead and unspawned in trap.
g-add 5% to total to allow for fish not sampled due to a flood.
h-one of these females found dead and unspawned in trap.
i-one of these females found dead and unspawned.
j-add 5% to total to allow for fish not sampled due to a flood.
k-add 5% to total to allow for fish not sampled due to a flood.

Appendix a-2. Summary of chum salmon spawning escapement, above and below Carnation Creek fence.

Year	Escapement	Year	Escapement
1970	2000	1981	2300
1971	1000	1982	1600
1972	1700	1983	1200
1973	4168	1984	950
1974	3060	1985	2700
1975	1200	1986	275
1976	1500	1987	325
1977	1700	1988	1500
1978	3300	1989	180
1979	450	1990	100
1980	3000	----	----
		Mean	1629

Appendix a-3. Summary of juvenile coho outmigration 1971-1990.

Year	Fry run	I+ <60 mm run	I+ ≥60mm run	I+ ≥60mm Mean fork ln.(mm)	II+ Run	II+ Mean fork ln.(mm)	Total fish ≥60mm	50% point of smolt run
*1971	122774	62	1000	76.6	1415	98.3	2415	May 14
1972	25664	40	1305	83.3	574	108.0	1879	May 04
1973	19183	141	974	77.4	776	101.9	1750	May 08
1974	21600	184	1030	74.2	1444	99.2	2474	May 09
1975	31364	128	1119	75.2	874	94.6	1993	May 09
1976	24714	206	1788	72.0	1068	92.8	2856	May 10
1977	7877	103	1522	78.1	935	97.5	2457	May 04
1978	13972	27	3441	83.6	778	100.0	4219	May 02
1979	5285	19	2843	80.6	668	96.3	3511	Apr 30
1980	27654	21	3555	85.4	991	104.6	4546	Apr 30
1981	11303	49	3719	82.4	396	104.1	4115	May 05
1982	4108	1	2847	86.6	622	100.1	3469	May 06
1983	9216	3	3437	86.1	305	103.0	3742	Apr 24
1984	2937	10	2984	84.0	119	102.2	3103	May 06
1985	9631	1	1787	92.1	190	104.7	1977	May 03
1986	1227	1	2744	85.5	88	105.2	2832	Apr 28
1987	7952	1	2408	91.6	239	112.4	2647	Apr 26
1988	3942	1	2683	83.4	28	107.3	2711	Apr 28
1989	2528	2	3580	90.7	280	105.1	3860	Apr 30
1990	3260	4	3128	84.2	89	109.8	3217	Apr 20

* Counts from a temporary fence, therefore run numbers are less accurate than during following years.

Appendix a-4. Summary of juvenile steelhead and cutthroat trout outmigration 1971-1990.

	Steelhead				Cutthroat		
	<100 mm	≥100 mm			<100 mm	≥100 mm	
Year	Run	Run	Mean length	50% point of run	Run	Run	Mean length
*1971	308	167	143.3	May 20	10	19	133.7
1972	39	59	153.2	Jun 09	-	4	155.8
1973	113	93	134.6	May 23	8	24	135.0
1974	179	78	144.5	May 22	7	48	144.9
1975	128	68	143.8	May 27	34	58	137.5
1976	301	113	133.9	May 24	16	78	129.3
1977	176	106	131.1	May 09	24	93	128.6
1978	7	103	139.0	May 10	7	60	122.6
1979	1	20	140.1	May 06	3	25	125.2
1980	10	51	161.9	May 09	6	60	141.7
1981	21	14	136.7	Apr 23	19	38	123.5
1982	17	36	134.6	May 10	8	6	152.3
1983	25	124	133.4	May 03	14	40	132.6
1984	5	27	145.0	Apr 21	14	40	120.9
1985	58	35	132.7	May 13	9	33	134.0
1986	14	28	137.0	Apr 18	8	13	116.5
1987	25	29	150.8	May 04	42	22	123.5
1988	26	23	129.1	May 04	13	19	126.2
1989	50	44	143.8	Apr 26	30	22	122.9
1990	2	25	146.9	Apr 20	1	29	136.0

* Counts from a temporary fence, therefore run numbers are less accurate than during later years.

Appendix a-5. Summary of late summer population estimates for lower Carnation Creek 1970-1989.

	Coho		Rainbow				Cottus aleuticus
YEAR	0	I	0	I	II	III	
1970	14129	790	1685	694	392		
1971	11824	1286	3451	501	119	128	
1972	9252	702	1597	386	58		2292
1973	9071	1229	5117	229	101	9	4539
1974	12584	1114	3545	456	76	10	4058
1975	11482	1333	2892	376	85		2488
1976	12327	1232	2939	355	80		1642
1977	10602	1236	344	232	258		1617
1978	10928	1089	136	94	68	9	3411
1979	13230	1546	-	39	-		1845
1980	20953	2142	269	16	24		1832
1981	5909	743	1774	116	8		2187
1982	7337	220	1063	346	47		1811
1983	9922	249	240	171	69		3776
1984	3005	139	1389	57	8		1576
1985	6825	-	843	120	8		783
1986	2916	98	554	35	35		574
1987	6584	293	107	14	7	7	351
1988	5107	287	1313	143			646
1989	7092	236	243	7			972

Appendix a-6. Summary of late summer juvenile coho density in Carnation Creek 1970-1989.

	Age 0 fish/m2 by section							Age I fish/m2 by section						
Yr	II	III	IV	V	VI	VIII	ALL	II	III	IV	V	VI	VIII	ALL
70	.89	1.18			1.73	.98	1.15	.06	.06			.08	.02	.06
71	1.14	.82	.44		.96	.99	.88	.16	.11	.05		.05	.05	.10
72	.60	.59	1.01		1.01	.86	.80	.05	.09	.06		.03	.09	.06
73	.61	.52	1.05	.44	.93	-	.73	.12	.10	.11	.05	.17	.04	.10
74	.66	.75	1.27	1.00	1.30	.68	.92	.10	.06	.13	.08	.08	.02	.08
75	.61	.38	.98	.86	1.00	.68	.75	.13	.05	.09	.05	.13	.03	.09
76	.72	.58	.92	.88	.69	.47	.69	.09	.08	.08	.07	.07	.04	.07
77	.24	.30	.44	1.18	.78	.30	.53	.10	.06	.09	.06	.04	.03	.06
78	.45	.35	.74	.66	.60	.27	.50	.02	.04	.05	.10	.10	.02	.05
79	.72	.60	1.14	.29	.51	.94	.74	.10	.12	.11	.10	.07	.04	.09
80	.70	.98	1.97	1.24	1.15	1.58	1.26	.12	.19	.19	.10	.11	.13	.13
81	.14	.43	.80	.38	.26	.30	.38	.02	.03	.09	.06	.03	.08	.05
82	.36	.56	.72	.35	.57	.53	.51	.01	.03	.01	.01	.00	.04	.02
83	.51	.57	.67	.61	.54	.69	.59	.01	.02	.03	.03	~.01	.01	.015
84	.23	.24	.31	.14	.19	.06	.20	.00	.004	.003	.01	.06	.01	.01
85	.35	.65	.36	.48	.76	.13	.40	.00	.00	~.005	.003	.00	.00	~.002
86	.35	.27	.36	.24	.19	.00	.26	.005	.03	.006	.00	.01	.00	.009
87	.80	.54	.83	.62	.49	1.99	.75	.05	.05	.01	.02	.04	.10	.03
88	.27	.35	1.03	.32	.30	.72	.48	.02	.004	.06	.06	.02	.00	.03
89	.45	.58	1.20	.51	.57	.05	.56	.05	.003	.04	.004	~.02	.00	.02

Note:

The values in the "ALL" columns were obtained by combining area and catch data from all sections.

Appendix I. Carnation Creek downstream migration 1987. Counts were separated by age (coho smolts) or fork length size (trout, <100mm, ≥100mm).

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
MARCH											
* 3	4	10	1	0	1	0	0	0	0	2	1
* 4	4	15	1	0	1	0	0	0	0	3	1
* 5	5	20	1	0	1	0	0	0	0	4	1
6	6	46	2	0	2	0	0	0	0	5	1
7	2	7	2	0	2	0	0	0	1	2	1
8	0	1	2	0	2	1	0	0	0	5	0
9	0	0	1	0	1	0	0	2	0	2	0
* 10	0	0	1	0	1	0	0	0	0	2	0
* 11	0	3	1	0	1	0	0	1	0	2	0
* 12	4	12	1	0	1	0	0	0	0	1	0
* 13	5	5	1	0	1	0	0	0	0	1	1
14	5	5	1	0	1	0	0	0	0	1	0
15	2	5	1	0	1	0	0	0	0	0	0
* 16	4	8	2	0	2	0	0	0	0	0	0
* 17	1	1	1	0	1	0	0	0	0	0	0
18	0	1	1	0	1	0	0	0	0	2	0
19	3	3	1	0	1	0	0	0	0	3	0
20	0	1	2	0	2	0	0	0	0	0	0
21	0	0	5	0	5	1	1	0	0	4	1
22	0	3	4	0	4	0	0	0	0	2	0
23	0	2	2	0	2	0	0	1	0	1	0
24	6	26	16	0	16	1	0	1	0	1	1
25	43	5	6	0	6	0	0	0	0	2	0
26	26	4	12	0	12	0	0	0	0	2	0
27	111	5	1	0	1	1	0	0	0	0	0
28	76	2	5	0	5	0	0	0	0	2	0
29	316	2	2	0	2	0	0	0	0	0	0
30	156	2	9	0	9	0	0	0	0	1	0
31	96	3	4	0	4	0	0	2	0	1	0
APRIL											
1	100	1	22	1	23	0	0	2	0	3	0
2	20	13	48	1	49	0	0	3	0	4	0
3	133	8	9	0	9	0	0	0	0	4	0
4	154	43	20	0	20	0	0	0	0	1	0
5	241	229	28	1	29	0	0	0	0	0	0
6	133	1039	122	4	126	1	2	0	0	1	0
* 7	310	2489	67	1	68	2	0	0	0	1	0
8	295	783	43	2	45	1	0	1	1	0	0
* 9	211	228	22	3	25	0	0	0	0	0	0
10	175	299	21	0	21	0	0	0	1	0	0
11	90	122	35	1	36	1	0	0	0	0	0
12	72	11	25	2	27	1	0	0	0	0	0
* 13	718	394	49	4	53	0	0	0	0	1	0
* 14	200	300	8	2	10	1	0	0	0	2	1
* 15	53	303	8	2	10	0	0	0	0	2	1

Appendix I. Continued. Carnation Creek downstream migration 1987.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
APRIL											
16	49	446	33	2	35	0	0	0	0	2	1
17	37	298	4	1	5	1	0	0	1	1	0
18	38	133	3	0	3	0	0	0	0	3	0
19	61	241	6	1	7	0	0	0	0	1	0
20	48	101	8	1	9	0	0	2	0	0	0
21	143	14	40	6	46	0	0	3	1	1	0
22	6	2	147	21	168	0	0	0	1	2	0
23	2	5	78	11	89	1	0	1	0	0	0
24	2	3	129	19	148	1	2	0	1	4	0
25	0	1	100	15	115	0	1	0	0	2	0
26	0	0	67	10	77	3	0	0	0	3	0
27	0	1	137	19	156	0	1	0	1	4	0
28	0	1	129	18	147	0	0	1	1	0	0
29	0	0	96	13	109	0	0	2	0	1	0
30	0	0	117	17	134	1	1	0	0	2	0
MAY											
1	0	0	96	14	110	0	0	2	0	2	0
2	0	6	99	14	113	1	4	4	1	0	0
3	0	18	71	6	77	0	2	3	2	0	0
4	0	2	31	3	34	0	1	1	0	0	0
5	0	13	55	5	60	0	0	0	0	0	0
6	0	0	22	2	24	0	2	0	1	1	0
7	0	0	25	2	27	0	2	2	2	0	0
8	0	1	43	3	46	0	5	1	2	3	0
9	0	0	46	4	50	0	2	0	0	1	0
10	0	0	50	2	52	0	0	0	1	1	0
11	0	17	45	2	47	3	1	1	0	1	0
12	0	6	18	0	18	0	1	0	1	0	0
13	0	10	6	0	6	0	0	0	0	0	0
14	0	11	16	1	17	0	0	1	0	0	0
15	0	1	5	0	5	0	1	0	0	0	0
16	0	2	4	0	4	0	0	2	0	0	0
17	0	2	8	1	9	0	0	0	0	1	0
18	0	2	10	0	10	0	0	0	0	2	0
19	0	0	10	1	11	0	0	0	0	0	0
20	0	1	8	0	8	0	0	0	0	1	0
21	0	0	9	1	10	0	0	0	0	0	0
22	0	1	2	0	2	0	0	1	0	0	0
23	0	0	5	0	5	2	0	0	1	0	0
24	0	1	2	0	2	0	0	1	0	1	0
25	0	1	2	0	2	0	0	0	0	0	0
26	0	2	0	0	0	1	0	0	0	0	0
27	0	1	1	0	1	0	0	0	0	1	0
28	0	30	2	0	2	0	0	0	0	0	0
* 29	0	21	1	0	1	0	0	0	0	1	0
* 30	0	5	0	0	0	0	0	0	0	0	0
* 31	0	0	0	0	0	0	0	0	0	0	0

Appendix I. Continued. Carnation Creek downstream migration 1987.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
JUNE											
1	0	0	0	0	0	0	0	1	0	0	0
2	0	23	0	0	0	0	0	0	0	0	0
3	0	5	0	0	0	0	0	0	0	0	0
4	0	5	1	0	1	0	0	0	0	0	0
5	0	2	0	0	0	0	0	0	0	0	0
6	0	4	1	0	1	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	1	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0
14	0	14	1	0	1	0	0	0	0	0	0
15	0	4	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	1	0	0
17	0	2	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0		
19	0	1	0	0	0	0	0	0	0		
20	0	5	0	0	0	0	0	0	0		
21	0	2	1	0	1	0	0	0	0		
22	0	2	0	0	0	0	0	0	1		
23	0	0	0	0	0	0	0	0	0		
24	0	3	0	0	0	0	0	0	0		
25	0	1	2	0	2	0	0	0	0		
26	0	3	0	0	0	0	0	0	0		
27	0	8	0	0	0	0	0	0	0		
28	0	1	0	0	0	0	0	0	0		
29	0	1	0	0	0	0	0	0	0		
30	0	2	0	0	0	0	0	0	0		
JULY											
1	0	1	0	0	0	0	0	0	0		
2	0	0	0	0	0	0	0	0	0		
3	0	2	0	0	0	0	0	0	0		
4	0	0	0	0	0	0	0	0	0		
5	0	0	0	0	0	0	0	0	0		
6	0	0	0	0	0	0	0	0	0		
7	0	0	0	0	0	0	0	0	0		
8	0	1	0	0	0	0	0	0	0		
9	0	0	0	0	0	0	0	0	0		
***											
TOTAL	4166	7952	2408	239	2647	25	29	42	22	112	11

Notes:

* Traps overflowed; estimates of lost catches are included in counts.

*** Fence dry.

Appendix II. Carnation Creek downstream migration 1988. Counts were separated by age (coho smolts) or fork length size (trout, <100mm, ≥100mm).

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	II+	TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
MARCH											
2	0	0	0	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	0	0	0	1	0
4	0	0	0	0	0	0	0	0	0	0	0
* 5	0	20	1	0	1	0	0	0	0	0	0
6	0	75	1	0	1	0	0	1	0	0	1
7	5	59	0	0	0	0	0	0	0	0	0
* 8	10	20	2	0	2	0	0	0	0	1	0
9	3	11	2	0	2	0	0	0	0	1	0
10	1	6	2	0	2	1	0	0	0	1	0
11	0	3	1	0	1	1	0	0	0	0	0
12	0	2	1	0	1	0	0	0	0	0	0
13	0	0	4	0	4	0	0	0	0	1	0
14	0	0	1	0	1	0	0	0	0	2	0
15	0	0	0	0	0	0	0	0	0	1	0
16	0	0	0	0	0	1	0	0	0	0	0
17	1	1	0	0	0	0	0	0	0	1	1
18	0	0	1	0	1	0	0	0	0	3	1
19	11	7	10	0	10	0	0	0	0	3	0
* 20	29	586	2	1	3	0	0	0	0	0	0
21	12	534	4	0	4	0	0	0	0	0	0
* 22	30	500	1	1	2	0	0	0	0	0	0
* 23	100	400	1	0	1	0	0	0	0	0	0
* 24	70	220	0	0	0	0	0	0	0	0	0
* 25	400	150	1	0	1	0	0	0	0	0	0
26	448	145	7	1	8	0	0	0	0	0	0
27	500	34	1	0	1	0	0	0	0	2	1
28	620	38	0	0	0	0	0	0	0	0	0
29	791	22	3	0	3	0	0	0	0	1	0
30	428	15	1	0	1	0	0	0	0	1	0
31	766	43	3	0	3	0	0	0	0	1	0
APRIL											
1	1062	121	31	1	32	0	0	0	0	1	0
* 2	1100	150	5	0	5	1	0	0	0	1	0
3	438	146	20	1	21	0	1	0	0	1	1
* 4	354	191	3	0	3	0	0	0	0	1	0
* 5	400	150	3	0	3	0	1	0	0	2	0
* 6	300	100	5	0	5	1	0	0	0	2	0
7	176	78	15	1	16	0	0	0	0	2	0
8	315	37	18	1	19	0	0	0	0	2	0
9	179	14	20	1	21	1	0	0	0	3	0
10	66	6	53	1	54	1	2	0	0	1	0
11	85	16	79	1	80	3	0	0	0	1	0
12	2	0	56	0	56	0	1	0	0	0	1
13	0	2	63	1	64	0	0	1	0	1	0
14	0	0	153	1	154	0	0	2	0	2	0
15	0	0	55	1	56	0	0	0	0	3	1

Appendix II. Continued. Carnation Creek downstream migration 1988.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
APRIL											
16	0	0	58	0	58	0	0	0	0	2	0
17	0	0	64	2	66	0	1	0	0	2	0
18	2	0	81	3	84	0	0	2	1	1	0
19	0	1	37	1	38	0	1	0	1	1	0
20	1	0	55	1	56	0	0	0	0	3	0
21	0	0	48	0	48	1	0	0	0	0	0
22	0	0	17	1	18	0	0	0	0	5	0
23	0	0	27	1	28	1	0	0	0	1	0
24	1	0	39	0	39	0	0	0	0	0	0
25	5	0	20	0	20	2	1	0	0	0	0
26	0	0	40	0	40	0	0	0	0	3	0
27	1	0	190	0	190	0	1	0	0	1	0
28	0	1	111	0	111	0	0	0	0	0	0
29	0	6	116	0	116	0	0	1	1	0	0
30	0	0	5	0	5	0	0	0	0	0	0
MAY											
1	0	0	0	0	0	0	0	0	0	0	0
* 2	0	0	0	0	0	0	0	0	0	0	0
3	0	3	90	1	91	1	1	0	0	0	0
4	0	6	75	1	76	0	2	0	1	0	0
5	0	0	90	1	91	1	0	0	2	1	0
6	0	0	85	0	85	1	2	0	1	0	0
7	0	0	75	1	76	0	0	0	0	1	0
8	0	2	70	1	71	0	2	0	0	1	0
9	0	1	31	0	31	1	1	0	0	0	0
10	0	0	52	0	52	0	0	0	1	1	1
11	0	0	30	0	30	1	0	2	0	0	0
12	0	0	32	1	33	0	0	1	0	3	0
13	0	1	165	0	165	1	1	0	0	0	0
14	0	1	56	0	56	0	0	0	0	1	0
15	0	1	68	0	68	0	0	0	1	0	0
16	0	0	11	0	11	0	0	0	1	0	0
17	0	0	8	0	8	0	0	0	0	0	0
18	0	2	40	0	40	2	0	0	0	1	0
19	0	0	4	0	4	0	0	0	1	0	0
20	0	0	30	0	30	1	1	1	2	1	0
21	0	0	5	0	5	0	0	0	0	0	0
22	0	1	20	0	20	2	1	0	1	0	0
23	0	0	19	0	19	0	0	0	0	0	0
24	0	0	13	0	13	0	0	0	0	0	0
25	0	0	10	0	10	0	1	2	0	0	0
26	0	0	10	0	10	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0
28	0	1	13	0	13	0	0	0	0	1	0
29	0	0	13	0	13	0	0	0	3	0	0
30	0	0	4	0	4	0	0	0	0	1	0
31	0	1	2	0	2	0	0	0	0	0	0

Appendix II. Continued. Carnation Creek downstream migration 1988.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
JUNE											
1	0	0	1	0	1	0	0	0	0	0	0
* 2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	1	7	0	7	0	1	0	0	0	0
5	0	0	3	0	3	0	0	0	1	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	1	5	0	5	0	0	0	0	0	0
8	0	2	2	0	2	1	1	0	0	0	0
9	0	1	0	0	0	0	0	0	0	0	0
10	0	1	1	0	1	0	0	0	0	0	0
11	0	0	1	0	1	0	0	0	0	0	0
12	0	1	1	0	1	0	0	0	1	0	0
13	0	0	2	0	2	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	1	0	1	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	1	0	1	0	0	0	0	0	0
TOTAL	8712	3937	2683	28	2711	26	23	13	19	75	8

Notes:

* Traps overflowed; estimates of lost catches are included in counts.

Appendix III. Carnation Creek downstream migration 1989. Counts were separated by age (coho smolts) or fork length size (trout, <100mm, ≥100mm).

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
MARCH											
4	0	0	0	0	0	0	0	0	0	0	0
5	24	0	1	0	1	1	0	0	0	0	0
6	20	0	0	0	0	0	0	0	0	0	0
7	9	0	0	0	0	0	0	0	0	0	0
8	6	0	1	1	2	0	0	0	0	1	0
9	0	0	1	0	1	0	0	0	0	0	0
10	0	0	1	1	2	0	0	0	0	1	0
* 11	2	0	2	0	2	0	0	0	0	1	0
* 12	11	11	1	1	2	0	0	0	0	0	0
* 13	43	2	2	0	2	0	0	0	0	0	0
14	16	4	1	1	2	0	0	0	0	0	0
15	32	7	1	0	1	0	0	0	0	0	1
16	9	1	0	0	0	0	0	0	0	0	1
17	5	0	0	0	0	0	0	0	0	0	0
18	3	7	1	0	1	0	0	0	0	0	1
19	218	1	0	0	0	0	0	0	0	0	1
20	66	2	0	0	0	0	0	0	0	0	0
21	381	15	7	2	9	1	0	0	0	2	0
22	289	32	7	1	8	0	0	2	0	0	0
23	199	0	0	0	0	0	0	2	0	2	0
24	229	1	0	0	0	0	0	0	0	0	0
25	152	1	0	1	1	0	0	0	0	0	0
* 26	734	160	9	3	12	0	1	0	0	2	0
* 27	400	50	4	1	5	0	0	0	0	1	0
* 28	211	25	3	0	3	0	0	0	0	0	0
29	487	27	1	0	1	0	0	0	0	0	0
30	627	35	1	0	1	0	0	0	0	1	0
31	759	30	4	0	4	0	1	0	1	0	0
APRIL											
* 1	600	50	5	0	5	0	0	0	0	0	0
2	631	85	8	0	8	0	0	0	0	0	0
* 3	564	61	0	0	0	0	0	0	0	0	0
* 4	688	102	8	2	10	0	0	0	0	0	0
* 5	894	68	37	2	39	0	1	0	0	0	0
* 6	600	50	9	1	10	0	1	0	0	3	1
7	318	48	2	3	5	0	1	0	0	5	1
8	1700	122	0	1	1	0	0	0	0	7	0
9	657	27	4	0	4	0	0	0	3	7	1
10	717	243	15	0	15	0	1	4	0	1	0
11	1511	266	15	0	15	0	2	2	1	0	0
12	1161	191	6	1	7	1	1	1	2	4	0
13	1654	61	8	0	8	3	0	0	2	2	0
14	2302	43	6	2	8	1	3	0	2	2	0
15	1389	11	3	0	3	0	1	0	0	3	1

Appendix III. Continued. Carnation Creek downstream migration 1989.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
APRIL											
16	817	5	3	1	4	1	0	1	1	1	0
17	752	4	15	2	17	0	1	0	0	2	0
18	698	3	15	3	18	0	0	1	0	0	0
19	2539	25	13	3	16	0	0	1	0	0	0
20	1863	348	141	19	160	0	0	3	1	0	1
21	449	70	113	10	123	3	0	1	0	0	0
22	637	89	116	6	122	1	0	0	1	0	0
23	232	40	57	3	60	0	2	0	0	0	0
24	118	6	179	13	192	0	2	0	0	4	0
25	63	1	169	8	177	1	3	0	2	4	0
26	87	4	134	11	145	0	1	2	0	1	0
27	28	0	118	6	124	1	5	0	1	1	0
28	20	0	210	15	225	1	3	0	0	1	0
29	9	0	152	9	161	2	1	2	0	4	0
30	12	0	215	16	231	7	3	1	2	7	0
MAY											
1	10	1	193	15	208	3	3	0	1	1	0
2	1	0	193	13	206	0	1	0	1	4	1
3	6	2	170	12	182	0	0	0	0	1	0
4	2	0	149	8	157	0	1	2	0	0	0
5	4	0	83	6	89	0	0	1	0	1	0
6	4	0	169	9	178	0	0	1	0	1	0
7	1	0	126	8	134	0	1	0	0	0	0
8	0	1	25	1	26	0	0	0	0	3	0
9	0	0	95	6	101	0	0	0	0	1	0
10	1	0	48	3	51	0	0	0	0	1	0
11	2	0	94	6	100	4	1	0	0	0	0
12	2	0	41	3	44	0	0	1	0	0	0
13	0	0	26	1	27	1	0	0	0	0	0
14	0	0	17	0	17	1	0	0	0	1	0
15	0	0	10	0	10	0	0	0	0	0	0
16	0	0	11	0	11	0	0	0	0	0	0
17	0	0	20	1	21	0	1	0	0	1	0
18	0	0	29	1	30	0	0	0	0	0	0
19	0	0	6	0	6	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0
23	0	0	1	0	1	0	0	0	0	0	0
24	0	0	5	0	5	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0
26	0	3	76	12	88	10	0	1	1	1	0
27	0	2	101	18	119	2	0	1	0	0	0
28	0	0	18	1	19	1	0	0	0	0	0
29	0	1	7	1	8	0	0	0	0	0	0
30	0	0	4	1	5	0	1	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0

Appendix III. Continued. Carnation Creek downstream migration 1989.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
JUNE											
***											
19	0	3	4	0	4	1	0	0	0	0	0
20	0	0	4	0	4	0	0	0	0	0	0
21	0	0	0	2	2	0	1	0	0	0	0
22	0	1	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0
***											
30	0	14	3	0	3	0	0	0	0	0	0
JULY											
1	0	21	9	1	10	0	0	0	0	0	0
2	0	11	8	1	9	0	0	0	0	0	0
3	0	10	7	0	7	2	0	0	0	0	0
4	0	10	1	1	2	0	0	0	0	0	0
5	0	4	1	0	1	0	0	0	0	0	0
6	0	4	0	0	0	1	0	0	0	0	0
7	0	1	1	0	1	0	0	0	0	0	0
8	0	1	1	0	1	0	0	0	0	0	0
TOT.	28675	2524	3580	280	3860	50	44	30	22	86	10

Notes:

* Traps overflowed; estimates of lost catches are included in counts.

*** Fence dry.

Appendix IV. Carnation Creek downstream migration 1990. Counts were seperated by age (coho smolts) or fork length size (trout, <100mm, ≥100mm).

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
FEB.											
28	0	0	2	0	2	0	0	0	0	0	0
MARCH											
1	0	0	2	0	2	0	0	0	0	1	1
2	0	0	2	0	2	0	0	0	0	1	0
3	0	1	4	0	4	0	0	0	0	1	0
4	0	1	3	1	4	0	0	0	0	0	0
* 5	0	1	3	0	3	0	0	0	0	0	0
6	0	0	2	0	2	0	0	0	0	1	0
7	0	0	5	0	5	0	0	0	0	3	0
8	0	0	4	0	4	0	0	0	0	0	0
* 9	0	0	4	0	4	0	0	0	0	2	0
* 10	0	0	4	0	4	0	0	0	0	2	0
11	1	0	6	0	6	0	0	0	0	4	0
12	2	0	3	0	3	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0
14	1	4	12	0	12	0	0	0	0	0	0
15	1	0	11	0	11	0	0	0	0	4	1
16	1	8	38	0	38	0	0	0	0	1	1
17	7	61	34	1	35	0	0	0	0	2	2
18	10	3	25	0	25	0	0	0	0	1	0
19	27	10	7	0	7	0	0	0	0	2	0
20	35	250	86	0	86	0	0	0	0	0	0
21	40	182	6	0	6	0	0	0	0	6	0
22	6	292	36	0	36	0	0	0	0	2	0
23	4	90	22	0	22	0	0	0	0	1	0
24	1	162	26	1	27	0	0	0	0	2	0
25	0	104	15	0	15	0	0	0	0	0	0
26	0	21	25	1	26	0	0	0	0	3	0
27	0	27	22	0	22	0	0	0	1	4	0
28	0	50	18	0	18	0	0	0	1	3	0
29	0	158	41	1	42	0	0	0	0	1	0
30	0	437	15	0	15	0	0	0	0	1	0
31	0	366	53	1	54	0	0	0	0	4	0
APRIL											
1	0	149	5	0	5	0	0	0	0	3	0
2	0	169	8	0	8	0	0	0	0	1	0
3	0	118	2	0	2	0	0	0	0	0	0
4	0	31	2	1	3	0	0	0	0	0	0
5	0	67	5	0	5	0	0	0	0	2	0
6	0	39	25	1	26	0	0	0	0	0	0
7	0	30	9	0	9	0	0	0	0	0	0
* 8	0	5	2	0	2	0	0	0	0	0	0
9	0	19	1	0	1	0	0	0	0	1	0
10	0	19	15	0	15	0	0	0	0	0	0
11	0	5	51	2	53	0	0	0	0	3	0
12	16	38	15	1	16	0	1	0	0	4	0
13	0	90	156	7	163	0	0	0	0	3	0
14	0	14	78	3	81	0	1	0	1	4	0

Appendix IV. Continued. Carnation Creek downstream migration 1990.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	II+	TOT	RAINBOW <100	≥100	CUTTHROAT <100	≥100	COTTUS ASPER	ALEUT.
APRIL											
15	0	17	43	2	45	0	0	0	3	5	0
16	0	32	35	0	35	0	5	0	2	6	0
17	0	4	189	13	202	0	2	0	2	4	0
18	0	26	32	0	32	0	0	0	0	1	0
19	0	8	289	12	301	0	1	0	2	1	0
20	0	3	243	7	250	0	3	0	0	1	0
21	0	10	84	1	85	0	2	0	0	1	0
22	0	9	204	9	213	0	0	0	2	1	0
23	0	5	69	3	72	0	0	0	0	1	0
24	0	1	59	0	59	0	0	0	0	0	0
25	0	6	341	13	354	0	1	0	1	0	1
26	0	6	123	3	126	0	0	0	1	0	0
27	0	2	15	0	15	0	0	0	0	0	0
28	0	3	7	0	7	0	2	0	0	1	1
29	0	0	18	1	19	0	1	0	0	0	0
30	0	0	16	1	17	0	0	0	0	0	0
MAY											
1	0	0	8	0	8	0	0	0	0	0	0
2	0	0	10	2	12	0	0	0	1	0	0
3	0	0	11	0	11	0	1	0	0	0	0
4	0	0	8	1	9	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	4	0	4	0	0	0	0	0	0
7	0	0	1	0	1	0	1	0	0	0	0
8	0	0	5	0	5	0	0	0	0	0	0
9	0	0	1	0	1	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	1	0
13	0	0	5	0	5	0	0	0	1	0	0
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	3	0	3	0	0	0	0	0	0
***											
20	0	0	85	0	85	0	0	0	0	0	0
21	0	3	156	0	156	0	4	0	5	1	0
* 22	0	2	5	0	5	0	0	0	0	0	0
* 23	0	0	5	0	5	0	0	0	0	0	0
* 24	0	0	5	0	5	0	0	0	0	0	0
* 25	0	0	7	0	7	0	0	0	0	1	1
* 26	0	1	5	0	5	0	0	0	0	0	1
27	0	4	27	0	27	0	0	0	1	0	0
28	0	0	13	0	13	0	0	0	0	0	0
29	0	0	4	0	4	0	0	0	0	0	1
30	0	1	6	0	6	0	0	0	1	0	0
* 31	0	0	5	0	5	0	0	0	0	0	0

Appendix IV. Continued. Carnation Creek downstream migration 1990.

DATE	CHUM FRY	COHO FRY	COHO SMOLTS I+	COHO SMOLTS II+	COHO SMOLTS TOT	RAINBOW <100	RAINBOW ≥100	CUTTHROAT <100	CUTTHROAT ≥100	COTTUS ASPER	COTTUS ALEUT.
JUNE											
1	0	0	0	0	0	0	0	0	0	0	0
* 2	0	0	2	0	2	0	0	0	0	0	0
* 3	0	5	3	0	3	0	0	0	0	0	0
* 4	0	5	2	0	2	0	0	0	0	0	0
* 5	0	5	3	0	3	0	0	0	0	0	0
6	0	4	2	0	2	0	0	1	0	0	0
7	0	10	2	0	2	0	0	0	0	0	0
8	0	11	16	0	16	0	0	0	1	0	0
9	0	3	0	0	0	0	0	0	0	0	0
* 10	0	2	2	0	2	0	0	0	0	0	0
11	0	2	1	0	1	0	0	0	0	0	0
12	0	2	7	0	7	0	0	0	0	0	0
13	0	9	7	0	7	0	0	0	1	0	0
14	0	10	6	0	6	0	0	0	1	0	0
15	0	4	2	0	2	0	0	0	0	1	0
16	0	2	5	0	5	0	0	0	0	0	0
17	0	3	6	0	6	0	0	0	1	0	0
18	0	6	5	0	5	0	0	0	0	0	0
19	0	5	3	0	3	0	0	0	0	0	0
20	0	15	1	0	1	2	0	0	0	0	0
21	0	0	1	0	1	0	0	0	0	0	0
TOTAL	152	3260	3132	89	3221	2	25	1	29	99	10

Notes:

* Traps overflowed; estimates of lost catches are included in counts.

*** Fence dry.

APPENDIX V. CARNATION CREEK (MAINSTREAM) POPULATION ESTIMATES OF JUVENILE COHO SALMON FOR 1987, 1988, 1989, AND 1990. VALUES ARE DISPLAYED BY STUDY SECTION (V=5; SEE FIG. 1 FOR LOCATION), BY ALL SECTIONS COMBINED (ALL), BY AGE (I=1+), AND BY TOTAL WETTED, RIFFLE AND POOL AREA.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
May 26-28/87																				
II	0	365	103	71	90	11	103	2.5	99	106	0.88	1.33	49.4	0.28	1.00	0.39	136.4	0.37	1.32	0.52
	I				0	2						2.97	66.8							
III	0	280	101	59	104	26	139	25.7	129	149	0.75	1.09	46.0	0.50	1.37	0.77	151.1	0.54	1.50	0.84
	I				0	1						3.55	78.0							
IV	0	490	178	48	181	30	217	12.0	210	224	0.83	0.94	44.5	0.44	1.22	0.70	203.9	0.42	1.15	0.65
V	0	288	104	64	95	15	113	5.5	108	117	0.84	1.02	45.9	0.39	1.08	0.61	115.1	0.40	1.11	0.63
	I				0	1						6.40	85.0							
VI	0	287	136	62	57	14	76	13.2	68	83	0.75	1.21	48.5	0.26	0.56	0.50	91.4	0.32	0.67	0.61
	I				1	0	1	0.0	1	1	1.00	2.46	62.0	0.00	0.01	0.01	2.5	0.01	0.02	0.02
VIII	0	491	78	100	223	35	265	12.6	257	272	0.84	1.00	47.0	0.54	3.39	0.64	285.7	0.58	3.66	0.69
ALL	0	2201	700	412	750	131	909	57.9	894	924	0.83	1.00	46.7	0.41	1.30	0.61	981.1	0.45	1.40	0.65
	I				1	4						4.29	73.6							
SEPT.14-16/87																				
II	0	215	5	81	170	3	173	0.1	173	174	0.90	2.41	61.0	0.80	34.61	0.02	417.1	1.94	83.41	1.99
	I				9	1	10	0.2	9	11	0.89	5.04	79.4	0.05	2.03	0.05	59.1	0.28	11.83	0.28
III	0	220	29	54	114	9	124	1.1	122	126	0.92	2.95	64.3	0.54	4.27	0.62	365.1	1.60	12.59	1.03
	I				6	3	12	36.0	0	24	0.50	6.42	82.1	0.05	0.41	0.06	77.0	0.34	2.66	0.39
IV	0	324	6	53	239	27	269	5.5	265	274	0.89	1.70	55.0	0.83	44.91	0.05	479.6	1.40	79.93	1.51
	I				4	0	4	0.0	4	4	1.00	5.21	79.2	0.01	0.67	0.01	20.0	0.06	3.47	0.07
V	0	107	21	63	89	21	110	10.0	100	125	0.76	2.22	50.7	0.02	5.55	0.70	250.6	1.30	12.31	1.50
	I				2	1	4	12.0	-3	11	0.50	6.62	03.3	0.02	0.19	0.02	20.5	0.14	1.20	0.10
VI	0	205	15	60	99	1	100	0.0	100	100	0.99	2.64	02.0	0.49	0.07	0.53	204.0	1.29	17.00	1.39
	I				0	1	7	0.4	0	0	0.03	5.04	79.4	0.04	0.40	0.04	40.0	0.20	2.71	0.21
VIII	0	72	0	110	139	4	143	0.1	142	144	0.97	2.05	04.0	1.99	0.00	1.99	407.9	5.07	0.00	5.07
	I				7	0	7	0.0	7	7	1.00	5.10	77.0	0.10	0.00	0.10	35.7	0.50	0.00	0.50
ALL	0	1231	76	429	050	55	920	7.4	915	926	0.92	2.37	00.2	0.75	12.11	0.00	2101.0	1.77	20.71	1.09
	I				34	6	41	2.7	30	45	0.02	5.00	00.0	0.03	0.54	0.04	239.5	0.19	3.15	0.21
JUNE 7-9/00																				
II	0	549	200	04	22	10	40	74.7	23	50	0.55	2.19	50.2	0.07	0.15	0.14	00.3	0.10	0.33	0.31
III	0	359	70	59	03	0	70	0.9	00	72	0.90	1.04	52.3	0.19	0.09	0.25	114.2	0.32	1.40	0.41
	I				2	1	4	12.0	-3	11	0.50	5.50	70.0	0.01	0.05	0.01	22.0	0.00	0.20	0.00
IV	0	520	109	52	224	40	273	10.5	204	201	0.02	1.24	40.0	0.52	1.01	0.70	330.1	0.04	2.00	0.94
	I				7	5	25	910.0	-30	05	0.29	4.34	73.5	0.05	0.14	0.07	100.3	0.20	0.03	0.30
V	0	302	123	05	20	7	37	0.9	32	43	0.75	1.50	51.0	0.10	0.30	0.10	59.0	0.10	0.40	0.25
	I				0	0	0	0.0	0	0	1.00	4.51	71.2	0.02	0.05	0.03	27.1	0.07	0.22	0.11
VI	0	303	157	53	9	0	27	540.0	-19	73	0.33	1.50	51.4	0.09	0.17	0.10	42.7	0.14	0.27	0.29
	I				1	1						5.91	02.0							
VIII	0	300	97	03	97	15	115	5.2	110	119	0.05	1.03	47.2	0.31	1.10	0.43	110.2	0.32	1.22	0.44
	I				2	0	2	0.0	2	2	1.00	7.59	00.5	0.01	0.02	0.01	15.2	0.04	0.10	0.00
ALL	0	2407	000	300	443	04	547	43.9	533	500	0.01	1.34	49.0	0.22	0.01	0.35	731.3	0.30	0.02	0.40
	I				10	7	29	27.1	19	40	0.01	5.25	77.2	0.01	0.03	0.02	104.0	0.00	0.17	0.10

APPENDIX V. CONTINUED. CARNATION CREEK JUVENILE COHO SALMON.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
SEPT.12-14/88																				
II	0	337	34	72	77	11	90	3.3	86	93	0.86	4.78	74.9	0.27	2.64	0.30	429.4	1.27	12.63	1.42
	I				5	1	6	0.6	5	8	0.80	9.04	90.2	0.02	0.18	0.02	56.5	0.17	1.66	0.19
III	0	272	28	61	86	8	95	1.2	93	97	0.91	5.22	76.5	0.35	3.39	0.39	495.0	1.82	17.68	2.03
	I				1	0	1	0.0	1	1	1.00	10.49	95.0	<.01	0.04	0.00	10.5	0.04	0.37	0.04
IV	0	247	9	53	232	20	254	2.7	251	257	0.91	2.56	61.1	1.03	20.21	1.07	650.0	2.63	72.22	2.73
	I				13	2	15	0.7	14	17	0.85	7.22	84.7	0.06	1.71	0.06	110.9	0.45	12.33	0.47
V	0	220	12	69	65	5	70	0.6	69	72	0.92	3.68	68.1	0.32	5.87	0.34	259.1	1.18	21.59	1.25
	I				11	2	13	1.0	11	15	0.82	6.81	81.9	0.06	1.12	0.06	91.6	0.42	7.63	0.44
VI	0	200	28	55	56	3	59	0.2	58	60	0.95	4.41	72.4	0.30	2.11	0.34	260.9	1.30	9.32	1.52
	I				3	1	5	2.3	2	8	0.67	7.80	88.7	0.02	0.16	0.03	35.1	0.10	1.25	0.20
VIII	0	199	3	118	131	12	144	1.8	142	147	0.91	3.41	67.3	0.72	49.07	0.74	491.8	2.47	163.92	2.51
ALL	0	1475	114	428	647	59	712	8.6	706	718	0.91	3.63	67.8	0.48	6.24	0.52	2583.3	1.75	22.66	1.90
	I				33	6	40	2.9	37	44	0.82	7.51	85.3	0.03	0.35	0.03	302.8	0.21	2.66	0.22
MAY 29-31/89																				
II	0	586	125	87	199	21	222	3.8	219	226	0.89	1.42	50.7	0.44	1.78	0.58	315.9	0.62	2.53	0.83
	I				1	0	1	0.0	1	1	1.00	5.85	80.0	0.00	0.01	0.00	5.8	0.01	0.05	0.02
III	0	339	37	57	183	24	211	6.2	206	216	0.87	1.21	47.9	0.62	5.69	0.78	254.9	0.75	6.89	0.84
IV	0	422	93	51	426	49	481	10.2	475	488	0.88	1.00	45.5	1.14	5.18	1.46	481.4	1.14	5.18	1.46
	I				8	1	9	0.2	8	10	0.88	5.46	77.8	0.02	0.10	0.03	49.9	0.12	0.54	0.15
V	0	306	82	70	129	20	153	7.0	147	158	0.84	1.19	48.7	0.50	1.86	0.68	181.7	0.59	2.22	0.81
	I				1	0	1	0.0	1	1	1.00	3.13	65.0	0.00	0.01	0.00	3.1	0.01	0.04	0.01
VI	0	319	94	62	101	28	148	36.3	128	152	0.72	1.14	48.4	0.44	1.49	0.62	159.3	0.50	1.69	0.71
	I				2	0	2	0.0	2	2	1.00	5.49	79.5	0.01	0.02	0.01	11.0	0.03	0.12	0.05
VIII	0	458	34	114	35	18	72	251.9	40	104	0.49	1.34	49.7	0.16	2.12	0.17	96.6	0.21	2.84	0.23
ALL	0	2350	465	441	1073	168	1261	52.3	1247	1276	0.85	1.16	47.7	0.54	2.71	0.67	1465.9	0.62	3.15	0.78
	I				12	1	13	0.1	12	14	0.92	5.32	77.2	0.01	0.03	0.01	69.6	0.03	0.15	0.04
SEPT. 10-12/89																				
II	0	400	71	82	172	7	179	0.4	178	180	0.96	3.97	70.9	0.45	2.53	0.54	711.8	1.78	10.03	2.16
	I				16	2	18	0.5	17	20	0.88	8.50	89.8	0.05	0.26	0.06	155.4	0.39	2.19	0.47
III	0	327	35	60	177	12	190	1.2	188	192	0.93	3.27	66.1	0.58	5.42	0.65	620.9	1.90	17.74	2.13
	I				1	0	1	0.0	1	1	1.00	8.98	92.0	<.01	0.03	0.00	9.0	0.03	0.26	0.03
IV	0	383	23	55	333	29	365	4.0	361	369	0.91	2.41	59.2	1.28	15.86	1.38	879.1	2.90	38.22	3.14
	I				10	1	11	0.2	10	12	0.90	7.06	85.5	0.04	0.48	0.04	78.4	0.26	3.41	0.28
V	0	255	47	70	126	5	131	0.2	130	132	0.96	3.17	65.8	0.51	2.79	0.63	415.9	1.63	8.85	2.60
	I				1	0	1	0.0	1	1	1.00	6.92	87.0	<.01	0.02	0.00	6.9	0.03	0.15	0.03
VI	0	257	54	60	137	8	145	0.6	144	147	0.94	3.64	69.0	0.57	2.69	0.72	529.6	2.06	9.81	2.61
	I				1	1	~4					9.71	94.0	~.02						
VIII	0	265	5	115	7	3	12	17.2	4	21	0.57	6.53	82.9	0.05	2.45	0.05	80.0	0.30	16.00	0.31
ALL	0	1807	235	442	952	64	1021	6.1	1016	1026	0.93	3.16	65.0	0.56	4.34	0.65	3224.0	1.78	13.72	2.05
	I				29	4	34	1.1	32	36	0.86	9.40	93.0	0.02	0.14	0.02	316.2	0.18	1.35	0.20

APPENDIX V. CONTINUED. CARNATION CREEK JUVENILE COHO SALMON.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
JUNE 19-28/90																				
II	0	471	93	76	158	13	172	1.6	170	175	0.92	2.36	59.8	0.37	1.85	0.46	406.3	0.86	4.37	1.07
	I				3	0	3	0.0	3	3	1.00	5.95	79.7	0.01	0.03	0.01	17.9	0.04	0.19	0.05
III	0	289	28	59	56	27	108	268.3	75	141	0.52	1.98	55.7	0.37	5.41	0.40	214.1	0.74	10.71	0.80
	I				2	1	4	12.0	-3	11	0.50	6.64	85.7	0.01	0.20	0.01	26.6	0.09	1.33	0.10
IV	0	352	123	55	168	33	209	18.6	200	218	0.80	1.48	50.1	0.59	1.78	0.91	309.4	0.88	2.52	1.35
	I				7	1	8	0.3	7	9	0.86	6.14	80.2	0.02	0.07	0.04	50.1	0.14	0.41	0.22
V	0	249	90	61	83	8	92	1.3	90	94	0.90	1.43	48.4	0.37	1.02	0.58	131.4	0.53	1.46	0.83
	I				6	0	6	0.0	6	6	1.00	5.20	76.7	0.02	0.07	0.04	31.2	0.13	0.35	0.20
VI	0	228	77	53	123	10	134	1.2	132	136	0.92	1.28	47.7	0.59	1.74	0.89	171.4	0.75	2.23	1.13
	I				3	0	3	0.0	3	3	1.00	6.73	81.0	0.01	0.04	0.02	20.2	0.09	0.26	0.13
VIII	0	453	233	104	51	26	104	346.6	67	141	0.49	1.04	45.5	0.23	0.45	0.47	108.2	0.24	0.46	0.49
ALL	0	2042	636	408	639	117	782	56.9	767	797	0.82	1.65	51.8	0.38	1.23	0.56	1289.0	0.63	2.03	0.92
	I				21	2	23	0.3	22	24	0.90	6.01	88.8	0.01	0.04	0.02	139.5	0.07	0.22	0.10

APPENDIX VI. SUMMER POPULATION ESTIMATES OF JUVENILE RAINBOW TROUT FROM CARNATION CREEK FOR 1987, 1988, 1989, AND 1990. VALUES ARE SHOWN BY STUDY SECTION (VI=6; SEE FIG.1 FOR LOCATION), BY AGE (II=2+), AND BY TOTAL WETTED, RIFFLE AND POOL AREA.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 26-28/87																				
V	I	288	184	64	0	1						7.12	90.0							
SEPT. 14-15/87																				
ALL	0	1231	76	429	15	0	15	0.0	15	15	1.00	2.70	63.7	0.01	0.20	0.01	40.5	0.03	0.53	0.04
	I				2	0	2	0.0	2	2	1.00	8.50	100.5	<.01	0.03	0.00	17.0	0.01	0.22	0.01
	II				1	0	1	0.0	1	1	1.00	30.00	143.0	<.01	0.01	0.00	30.0	0.03	0.41	0.03
	III				1	0	1	0.0	1	1	1.00	35.00	156.0	<.01	0.01	0.00	35.0	0.03	0.46	0.03
JUNE 7-9/88																				
ALL	I	2466	891	396	4	2	8	24.0	-2	18	0.50	10.36	98.8	0.00	0.01	0.01	82.9	0.03	0.09	0.05
	II				1	1						22.62	125.0							
SEPT.12-14/88																				
II	I	337	34	72	2	0	2	0.0	2	2	1.00	15.97	119.5	0.01	0.06	0.01	31.9	0.09	0.94	0.11
III	I	272	28	61	0	1	~2					11.56	106.0	~.01						
IV	0	247	9	53	6	3	12	36.0	0	24	0.50	2.96	67.2	0.05	1.33	0.05	35.5	0.14	3.95	0.15
	I				1	2	~6					8.99	96.3	~.02						
V	0	228	12	69	63	14	81	10.4	75	87	0.78	1.71	55.8	0.37	6.75	0.39	138.5	0.63	11.54	0.67
	I				1	2	~6					13.07	103.7	~.03						
VI	0	200	28	55	47	10	60	6.7	55	65	0.79	3.19	67.3	0.30	2.13	0.35	190.5	0.95	6.80	1.11
	I				4	0	4	0.0	4	4	1.00	14.27	107.7	0.02	0.14	0.02	57.1	0.29	2.04	0.33
VIII	0	199	3	118	22	7	32	13.6	25	40	0.68	1.96	58.3	0.16	10.76	0.16	63.2	0.32	21.08	0.32
	I				2	0	2	0.0	2	2	1.00	8.66	99.0	0.01	0.67	0.01	17.3	0.09	5.77	0.09
ALL	0	1475	114	428	138	34	183	32.4	172	194	0.75	2.31	60.5	0.12	1.61	0.13	422.6	0.29	3.71	0.31
	I				10	5	20	60.0	5	35	0.50	12.67	103.5	0.01	0.18	0.01	253.5	0.17	2.22	0.19
MAY 29-31/89																				
II	I	586	125	87	6	2	9	4.5	5	13	0.67	7.26	87.1	0.02	0.07	0.02	65.3	0.13	0.52	0.17
III	I	339	37	57	1	1						8.81	94.5							
IV	I	422	93	51	1	1						9.73	90.5							
V	I	366	82	70	6	4	18	360.0	-20	56	0.33	5.55	80.4	0.06	0.22	0.08	99.9	0.33	1.22	0.45
	II				1	0	1	0.0	1	1	1.00	21.40	130.0	0.00	0.01	0.00	21.4	0.07	0.26	0.10
	III				1	0	1	0.0	1	1	1.00	68.40	183.0	0.00	0.01	0.00	68.4	0.22	0.83	0.31
VI	I	319	94	62	9	6	27	540.0	-19	73	0.33	5.86	83.0	0.08	0.29	0.12	158.2	0.50	1.68	0.70
VIII	I	458	34	114	1	0	1	0.0	1	1	1.00	8.75	92.0	0.00	0.03	0.00	8.8	0.02	0.26	0.02
	II				1	0	1	0.0	1	1	1.00	16.80	118.0	0.00	0.03	0.00	16.8	0.04	0.49	0.04
ALL	I	2358	465	441	24	14	58	429.0	16	99	0.42	7.17	86.4	0.02	0.12	0.03	413.0	0.18	0.89	0.22
	II				2	0	2	0.0	2	2	1.00	19.10	124.0	0.00	0.00	0.00	38.2	0.02	0.08	0.02
	III				1	0	1	0.0	1	1	1.00	68.40	183.0	0.00	0.00	0.00	68.4	0.03	0.15	0.04

APPENDIX VI. CONTINUED. CARNATION CREEK JUVENILE RAINBOW TROUT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
SEPT. 10-12/89																				
II	I	400	71	82	2	1	4	12.0	-3	11	0.50	12.91	105.7	0.01	0.06	0.01	51.6	0.13	0.73	0.16
III	I	327	35	60	1	0	1	0.0	1	1	1.00	6.55	82.0	<.01	0.03	0.00	6.6	0.02	0.19	0.02
IV	I	303	23	55	5	0	5	0.0	5	5	1.00	10.60	99.2	0.02	0.22	0.02	53.0	0.17	2.30	0.19
V	I	255	47	70	7	0	7	0.0	7	7	1.00	8.67	96.3	0.03	0.15	0.03	60.7	0.24	1.29	0.29
	II				1	0	1	0.0	1	1	1.00	32.65	148.0	0.00	0.02	0.00	32.7	0.13	0.69	0.16
VI	I	257	54	60	14	0	14	0.0	14	14	1.00	10.00	98.7	0.05	0.26	0.07	141.1	0.55	2.61	0.78
VIII	I	265	5	115	4	1	5	1.0	3	7	0.75	4.63	77.0	0.02	1.07	0.02	24.7	0.09	4.94	0.09
ALL	I	1807	235	442	33	2	35	0.2	34	36	0.94	9.24	95.3	0.02	0.15	0.02	324.4	0.18	1.38	0.21
	II				1	0	1	0.0	1	1	1.00	32.65	148.0	0.00	0.00	0.00	32.7	0.02	0.14	0.02
JUNE 19-23/90																				
ALL	I	2842	535	400	2	0	2	0.0	2	2	1.00	16.00	116.5	0.00	0.00	0.00	32.0	0.02	0.05	0.02
	II				2	0	2	0.0	2	2	1.00	31.40	145.5	0.00	0.00	0.00	62.8	0.03	0.10	0.04

APPENDIX VII. SUMMER POPULATION ESTIMATES OF JUVENILE CUTTHROAT TROUT IN LOWER (0-3078M) CARNATION CREEK FOR 1987, 1988, 1989, AND 1990. DATA WAS POOLED FOR 'ALL' STUDY SECTIONS AND VALUES ARE SHOWN BY AGE (III=3+) AND BY TOTAL WETTED, RIFFLE AND POOL AREA.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 26-28/87																				
ALL	0	2200	699	412	9	4	16	27.0	6	27	0.56	0.25	31.1	0.01	0.02	0.01	4.1	0.00	0.01	0.00
	I				10	3	14	4.9	10	19	0.76	7.75	91.2	0.01	0.02	0.01	110.7	0.05	0.16	0.07
	II				3	3						22.77	126.8							
SEPT. 14-16/87																				
ALL	0	1231	76	429	126	21	151	0.5	145	157	0.83	2.45	63.9	0.12	1.99	0.13	370.4	0.30	4.87	0.32
	I				14	1	15	0.1	14	16	0.93	11.18	104.2	0.01	0.20	0.01	168.6	0.14	2.22	0.15
	II				4	1	5	1.0	3	7	0.75	21.21	136.8	<.01	0.07	0.00	113.1	0.09	1.49	0.10
	III				0	1	~2					68.00	193.0	<.01						
JUNE 7-9/88																				
ALL	0	2466	891	396	1	1						0.19	28.0							
	I				1	0	1	0.0	1	1	1.00	18.45	116.0	0.00	0.00	0.00	18.5	0.01	0.02	0.01
SEPT.12-14/88																				
ALL	0	1475	113	428	2	0	2	0.0	2	2	1.00	2.40	63.5	<.01	0.02	0.00	4.8	0.00	0.04	0.00
	I				2	1	4	12.0	-3	11	0.50	9.55	101.3	<.01	0.04	0.00	38.2	0.03	0.34	0.03
	II				2	0	2	0.0	2	2	1.00	35.42	157.0	<.01	0.02	0.00	70.8	0.05	0.63	0.05
	III				1	0	1	0.0	1	1	1.00	60.50	185.0	<.01	0.01	0.00	60.5	0.04	0.54	0.04
MAY 29-31/89																				
ALL	I	2350	465	441	7	1	8	0.3	7	9	0.86	7.00	87.5	0.00	0.02	0.00	57.2	0.02	0.12	0.03
	II				4	2	8	24.0	-2	18	0.50	15.86	110.7	0.00	0.02	0.00	126.9	0.05	0.27	0.07
SEPT.10-12/89																				
ALL	I	1807	234	442	7	2	10	2.0	6	13	0.71	11.57	104.2	0.01	0.04	0.01	113.4	0.06	0.48	0.07
	II				2	1	4	12.0	-3	11	0.50	39.48	157.7	<.01	0.02	0.00	157.9	0.09	0.67	0.10
JUNE 19-23/90																				
ALL	I	2842	635	488	2	1	4	12.0	-3	11	0.50	10.50	103.0	0.00	0.01	0.00	42.0	0.02	0.07	0.03
	II				3	0	3	0.0	3	3	1.00	36.00	143.0	0.00	0.00	0.00	92.4	0.05	0.15	0.07
	III				0	1						100.00	224.0							

APPENDIX VIII. SUMMER POPULATION ESTIMATES OF CARNATION CREEK COTTUS ALEUTICUS FOR 1987, 1988, 1989, AND 1990. DATA WAS POOLED FOR 'ALL' AGES AND VALUES ARE SHOWN BY STUDY SECTION (III=3; SEE FIG. 1 FOR LOCATION), BY 'ALL' STUDY SECTIONS COMBINED, AND BY TOTAL WETTED, RIFFLE AND POOL AREA.

SEC	AGE	AREA (SQ.M) WET	RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	RIF	POOL	WETTED TOT WT (GM)	GM./SQ.M WET	RIF	POOL
MAY 26-28/87																				
II	ALL	365	103	71	15	7	28	59.2	13	44	0.53	4.19	78.6	0.08	0.27	0.11	117.8	0.32	1.14	0.45
III	ALL	200	101	59	7	2	10	2.8	6	13	0.71	4.70	73.9	0.04	0.10	0.05	46.1	0.16	0.46	0.26
IV	ALL	490	170	48	5	1	6	0.6	5	8	0.88	9.43	94.3	0.01	0.04	0.02	58.9	0.12	0.33	0.19
V	ALL	200	104	64	7	10						7.90	88.6							
VI	ALL	207	136	62	5	5						9.05	92.7							
VIII	ALL	491	70	100	1	2						12.10	101.7							
ALL	ALL	2201	700	412	40	27	123	2736.2	10	220	0.32	6.64	81.5	0.06	0.10	0.00	017.7	0.37	1.17	0.54
SEPT. 14-16/87																				
II	ALL	215	5	01	14	5	22	14.2	14	29	0.64	4.72	74.1	0.10	4.30	0.10	102.0	0.40	20.50	0.49
III	ALL	220	29	54	1	3	~8					2.71	60.2	~.04						
IV	ALL	324	6	53	7	1	0	0.3	7	9	0.00	9.01	94.4	0.03	1.30	0.03	70.5	0.24	13.00	0.25
V	ALL	107	21	03	1	2	~6					9.39	93.0	~.03						
VI	ALL	205	15	00	4	1	5	1.0	3	7	0.75	10.53	95.0	0.03	0.30	0.03	50.2	0.27	3.74	0.30
VIII	ALL	72	0	110	0	0	0							0.00						
ALL	ALL	1231	70	429	27	12	49	00.9	31	67	0.50	5.00	70.0	0.04	0.04	0.03	204.9	0.23	3.75	0.25
JUNE 7-9/00																				
II	ALL	549	200	04	10	5	25	0.5	20	30	0.72	5.92	75.0	0.05	0.09	0.09	147.5	0.27	0.55	0.52
III	ALL	359	70	59	2	5						0.35	70.9							
IV	ALL	520	109	52	5	0	5	0.0	5	5	1.00	14.54	105.0	0.01	0.03	0.01	72.7	0.14	0.43	0.20
V	ALL	302	123	05	0	2						10.77	101.5							
VI	ALL	303	157	53	1	5						7.30	07.0							
VIII	ALL	300	97	03	2	1	4	12.0	-3	11	0.50	10.30	112.7	0.01	0.04	0.01	05.4	0.10	0.07	0.24
ALL	ALL	2467	000	300	20	10	70	1100.5	10	147	0.30	7.73	03.9	0.03	0.00	0.05	000.9	0.25	0.00	0.30
SEPT.12-14/00																				
II	ALL	337	34	72	17	0	32	70.5	15	49	0.53	2.92	00.0	0.10	0.94	0.11	93.0	0.20	2.70	0.31
III	ALL	272	20	01	10	3	14	4.9	10	19	0.70	4.21	70.7	0.05	0.51	0.00	00.1	0.22	2.15	0.25
IV	ALL	247	9	53	3	4	~12					10.30	93.9	~.00						
V	ALL	220	12	09	0	7	~20					10.10	94.4	~.12						
VI	ALL	200	20	55	2	0	2	0.0	2	2	1.00	10.01	93.0	0.01	0.07	0.01	20.0	0.10	0.72	0.12
VIII	ALL	199	3	110	0	0	0							0.00						
ALL	ALL	1475	114	420	30	22	90	039.9	40	141	0.42	0.20	70.0	0.00	0.79	0.07	507.2	0.30	4.90	0.42

APPENDIX VIII. CONTINUED. CARNATION CREEK COTTUS ALEUTICUS.

SEC	AGE	AREA (SQ.M) WET	RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	RIF	POOL	WETTED TOT WT (GM)	GM./SQ.M WET	RIF	POOL
MAY 29-31/89																				
II	ALL	506	125	87	12	4	18	9.0	12	24	0.67	4.05	68.6	0.04	0.14	0.05	72.9	0.14	0.58	0.19
III	ALL	339	37	57	5	7						5.21	75.6							
IV	ALL	422	93	51	2	4						11.69	100.0							
V	ALL	306	82	70	5	2	8	8.6	2	14	0.60	10.24	96.4	0.03	0.10	0.04	85.3	0.28	1.04	0.38
VI	ALL	319	94	62	2	1	4	12.0	-3	11	0.50	8.11	92.7	0.01	0.04	0.02	32.4	0.10	0.35	0.14
VIII	ALL	458	34	114	0	0	0													
ALL	ALL	2350	465	441	26	18	85	2352.8	-13	182	0.31	7.43	83.8	0.04	0.18	0.05	628.2	0.27	1.35	0.33
SEPT. 10-12/89																				
II	ALL	400	71	82	27	13	52	128.3	29	75	0.52	4.17	70.3	0.13	0.73	0.16	217.1	0.54	3.06	0.66
III	ALL	327	35	60	13	12	169	-	-	-	0.08	5.53	77.6	0.52	4.83	0.58	934.6	2.86	26.70	3.20
IV	ALL	303	23	55	7	2	10	2.8	6	13	0.71	9.86	89.9	0.03	0.43	0.04	96.6	0.32	4.20	0.35
V	ALL	255	47	70	7	6	49	22932.0	-254	352	0.14	6.76	84.4	0.19	1.04	0.24	331.2	1.30	7.05	1.59
VI	ALL	257	54	60	2	1	4	12.0	-3	11	0.50	13.04	105.7	0.02	0.07	0.02	52.2	0.20	0.97	0.26
VIII	ALL	265	5	115	2	0	2	0.0	2	2	1.00	22.36	119.5	0.01	0.40	0.01	44.7	0.17	0.94	0.17
ALL	ALL	1807	235	442	58	34	140	1078.3	74	206	0.41	6.15	78.4	0.08	0.60	0.09	861.6	0.48	3.67	0.55
JUNE 19-23/90																				
II	ALL	471	93	76	18	7	29	27.1	19	40	0.61	6.72	77.4	0.06	0.32	0.08	197.9	0.42	2.13	0.52
III	ALL	289	20	59	4	2	8	24.0	-2	18	0.50	5.53	74.8	0.03	0.40	0.03	44.2	0.15	2.21	0.16
IV	ALL	352	123	55	5	0	5	0.0	5	5	1.00	3.40	66.3	0.01	0.04	0.02	17.0	0.05	0.14	0.07
V	ALL	249	90	61	4	1	5	1.0	3	7	0.75	5.04	72.8	0.02	0.06	0.03	26.9	0.11	0.30	0.17
VI	ALL	228	77	53	1	4						6.43	75.6							
VIII	ALL	453	233	104	3	1	5	2.3	2	8	0.67	8.01	86.0	0.01	0.02	0.02	36.0	0.08	0.15	0.16
ALL	ALL	2042	636	408	35	15	61	86.1	43	80	0.57	6.15	76.0	0.03	0.10	0.04	376.8	0.18	0.59	0.27

APPENDIX IX. POPULATION ESTIMATES OF CARNATION CREEK COTTUS ASPER FOR 1987, 1988, 1989, AND 1990. DATA WAS POOLED FOR 'ALL' AGE GROUPS AND VALUES ARE SHOWN BY STUDY SECTION AND BY SECTION AREA (WETTED, RIFFLE, POOL).

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 26-28/87																				
II	ALL	365	183	71	4	2	8	24.8	-2	18	0.50	8.49	90.2	0.02	0.08	0.03	67.9	0.19	0.66	0.26
III	ALL	280	101	59	3	1	5	2.3	2	8	0.67	13.43	105.2	0.02	0.04	0.03	60.4	0.22	0.60	0.34
SEPT. 14-16/87																				
II	ALL	215	5	81	2	2	~8					7.25	90.7	~.04						
IV	ALL	324	6	53	1	0	1	0.0	1	1	1.00	10.00	101.0	0.00	0.17	0.00	10.0	0.03	1.00	0.03
JUNE 7-9/88																				
II	ALL	549	266	84	2	1	4	12.0	-3	11	0.50	17.11	112.7	0.01	0.02	0.01	68.4	0.12	0.26	0.24
SEPT. 12-14/88																				
II	ALL	337	34	72	0	5	~10					12.40	97.0	~.03						
III	ALL	272	28	61	4	0	4	0.0	4	4	1.00	21.10	110.7	0.01	0.14	0.02	84.7	0.31	3.03	0.35
MAY 29-31/89																				
II	ALL	506	125	87	1	0	1	0.0	1	1	1.00	10.20	97.0	0.00	0.01	0.00	10.2	0.02	0.00	0.03
III	ALL	339	37	57	1	1						11.85	99.0							
SEPT. 10-12/89																				
II	ALL	400	71	82	4	3	16	1000.0	-47	79	0.25	16.39	112.3	0.04	0.23	0.05	262.2	0.66	3.69	0.00
III	ALL	327	35	60	2	0	2	0.0	2	2	1.00	13.72	104.0	0.01	0.06	0.01	27.4	0.08	0.78	0.09
JUNE 19-23/90																				
II	ALL	471	93	76	5	1	6	0.6	5	8	0.00		81.8	0.01	0.07	0.02				

APPENDIX X. POPULATION ESTIMATES OF JUVENILE CUTTHROAT TROUT IN TRIBUTARY "C" (SEE FIG. 1 FOR LOCATION) OF CARNATION CREEK. DATA ARE SHOWN BY AGE (II=2+) AND BY AREA (WETTED, RIFFLE, POOL).

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
JUNE 4/87																				
I	I	172	58	57	8	2	11	2.0	8	13	0.75	8.62	87.7	0.06	0.21	0.09	91.9	0.53	1.84	0.75
	II				1	0	1	0.0	1	1	1.00	28.70	134.0	0.01	0.02	0.01	28.7	0.17	0.57	0.24
SEPT.14/87																				
I	0	133	77	57	11	1	12	0.1	11	13	0.91	1.36	50.8	0.09	0.16	0.22	16.5	0.12	0.21	0.29
	I				6	2	9	4.5	5	13	0.67	13.13	107.5	0.07	0.12	0.16	118.2	0.89	1.53	2.11
	II				1	0	1	0.0	1	1	1.00	26.60	142.0	0.01	0.01	0.02	26.6	0.20	0.35	0.47
	III				1	0	1	0.0	1	1	1.00	41.00	155.0	0.01	0.01	0.02	41.0	0.31	0.53	0.73
JUNE 9/88																				
I	I	176	129	57	9	2	12	1.5	9	14	0.78	7.67	85.4	0.07	0.09	0.28	88.8	0.52	0.69	2.16
	II				2	0	2	0.0	2	2	1.00	28.54	136.0	0.01	0.02	0.05	57.1	0.34	0.44	1.39
SEPT.16/88																				
I	0	83	39	58	12	6	24	72.0	7	41	0.50	1.33	49.3	0.29	0.62	0.55	31.9	0.38	0.82	0.73
	I				12	0	12	0.0	12	12	1.00	12.32	106.6	0.14	0.31	0.27	147.8	1.78	3.79	3.36
	II				0	1						37.58	161.0							
MAY 29/89																				
I	I	135	88	58	6	2	9	4.5	5	13	0.67	7.44	88.1	0.07	0.10	0.19	67.0	0.50	0.76	1.42
	II				2	0	2	0.0	2	2	1.00	26.29	137.5	0.01	0.02	0.04	52.6	0.39	0.60	1.12
	III				1	0	1	0.0	1	1	1.00	53.50	177.0	0.01	0.01	0.02	53.5	0.40	0.61	1.14
SEPT. 13/89																				
I	0	111	61	59	19	0	19	0.0	19	19	1.00	2.34	60.6	0.17	0.31	0.38	44.5	0.40	0.73	0.89
	I				4	1	5	1.0	3	7	0.75	18.85	101.4	0.05	0.09	0.11	57.9	0.52	0.95	1.16
	II				0	1						37.15	154.0							
	III				1	0	1	0.0	1	1	1.00	83.10	190.0	0.01	0.02	0.02	83.1	0.75	1.36	1.66
JUNE 24/98																				
I	I	142	93	61	4	2	8	24.0	-2	18	0.50	7.60	85.3	0.06	0.09	0.16	60.8	0.43	0.65	1.24
	III				0	1						52.50	162.0							

APPENDIX XI. POPULATION ESTIMATES OF JUVENILE CUTTHROAT TROUT FROM STUDY SECTION IX OF UPPER CARNATION CREEK. DATA ARE SHOWN BY AGE (I=1+) AND BY AREA (TOTAL WETTED, RIFFLE, POOL).

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
JUNE 4/87																				
IX	I	200	163	74	12	7	29	214.5	0	58	0.42	6.10	79.0	0.10	0.10	0.25	175.7	0.63	1.08	1.58
	II				0	1	9	0.2	0	10	0.08	19.70	125.9	0.03	0.06	0.08	100.0	0.05	1.11	1.55
SEPT. 17/87																				
IX	0	151	38	70	10	5	25	6.5	20	30	0.72	1.21	49.7	0.17	0.06	0.22	30.2	0.20	0.79	0.27
	I				20	0	39	11.3	32	46	0.71	7.10	07.3	0.26	1.03	0.35	270.3	1.04	7.32	2.46
	II				0	1	9	0.2	0	10	0.00	20.15	120.9	0.06	0.24	0.00	104.2	1.22	4.05	1.03
	III				1	0	1	0.0	1	1	1.00	43.50	103.0	0.01	0.03	0.01	43.5	0.29	1.14	0.30
JUNE 10/00																				
IX	I	270	122	00	25	0	33	5.4	20	30	0.70	7.70	00.9	0.12	0.27	0.21	253.3	0.92	2.00	1.04
	II				3	1	5	2.3	2	0	0.07	22.05	127.5	0.02	0.04	0.03	101.9	0.37	0.04	0.00
SEPT. 15/00																				
IX	0	200	70	00	0	2	11	2.0	0	13	0.75	1.01	53.4	0.05	0.14	0.00	17.2	0.00	0.22	0.13
	I				25	4	30	1.5	27	32	0.04	10.73	101.0	0.14	0.30	0.23	310.3	1.54	4.09	2.40
MAY 31/09																				
IX	I	220	01	72	13	5	21	10.0	13	30	0.02	0.13	03.1	0.10	0.35	0.13	129.5	0.59	2.12	0.01
	II				5	4	25	3000.0	-95	145	0.20	20.92	129.3	0.11	0.41	0.10	523.0	2.30	0.57	3.29
SEPT. 13/09																				
IX	0	202	49	73	59	25	102	130.0	79	120	0.50	1.20	50.0	0.51	2.09	0.07	129.0	0.04	2.03	0.04
	I				10	3	22	1.2	19	24	0.03	12.24	105.2	0.11	0.44	0.14	264.4	1.31	5.40	1.73
	II				3	0	3	0.0	3	3	1.00	29.54	140.3	0.01	0.00	0.02	00.0	0.44	1.01	0.50
JUNE 20/90																				
IX	0	191	110	09	0	1	7	0.4	0	0	0.03	0.17	27.0	0.04	0.07	0.09	1.2	0.01	0.01	0.02
	I				11	4	17	12.1	10	24	0.04	5.24	77.7	0.09	0.10	0.21	90.0	0.47	0.02	1.12
	II				5	0	5	0.0	5	5	1.00	32.20	145.0	0.03	0.05	0.00	101.4	0.05	1.47	1.99

APPENDIX XII. POPULATION ESTIMATES OF JUVENILE CUTTHROAT TROUT FROM STUDY SECTION X OF UPPER CARNATION CREEK. DATA ARE SHOWN BY AGE (III=3+) AND BY AREA (TOTAL WETTED, RIFFLE, POOL).

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
JUNE 11/87																				
X	I	295	52	68	15	9	38	337.5	1	74	0.40	6.24	84.5	0.13	0.72	0.15	234.0	0.79	4.50	0.96
	II				16	5	23	9.2	17	29	0.69	20.50	125.8	0.08	0.45	0.10	477.1	1.62	9.17	1.96
	III				0	1						41.60	155.0							
SEPT. 17/87																				
X	0	244	26	70	31	7	40	5.4	35	45	0.77	1.03	46.6	0.16	1.54	0.18	41.2	0.17	1.59	0.19
	I				22	6	30	7.4	25	36	0.73	8.49	94.6	0.12	1.16	0.14	256.8	1.05	9.88	1.18
	II				11	5	20	37.3	8	32	0.55	21.18	130.4	0.08	0.78	0.09	427.1	1.75	16.43	1.96
	III				1	0	1	0.0	1	1	1.00	43.50	163.0	0.00	0.04	0.00	43.5	0.18	1.67	0.20
JUNE 16/88																				
X	I	296	76	71	28	7	37	6.9	32	43	0.75	7.50	87.0	0.13	0.49	0.17	280.0	0.95	3.68	1.27
	II				6	1	7	0.4	6	8	0.83	18.93	118.4	0.02	0.09	0.03	136.3	0.46	1.79	0.62
SEPT. 15/88																				
X	0	251	36	70	37	14	60	48.9	46	74	0.62	1.40	58.7	0.24	1.65	0.28	83.3	0.33	2.31	0.39
	I				17	6	26	16.3	18	34	0.65	11.06	101.6	0.10	0.73	0.12	290.6	1.16	8.07	1.35
JUNE 1/89																				
X	I	388	43	75	11	6	24	118.5	2	46	0.45	7.17	86.6	0.08	0.56	0.09	173.5	0.56	4.04	0.65
	II				5	2	8	8.6	2	14	0.66	19.77	125.8	0.03	0.19	0.03	164.8	0.53	3.83	0.62
SEPT. 13/89																				
X	0	255	31	72	23	8	35	20.7	26	44	0.65	1.73	55.7	0.14	1.14	0.16	61.0	0.24	1.97	0.27
	I				13	6	24	48.1	10	38	0.54	14.56	113.5	0.09	0.78	0.11	351.5	1.38	11.34	1.57
	II				4	2	8	24.0	-2	18	0.58	30.32	144.8	0.03	0.26	0.04	242.6	0.95	7.82	1.08
JUNE 26/90																				
X	0	333	167	63	1	0	1	0.0	1	1	1.00	0.10	26.0	0.00	0.01	0.01	0.1	0.00	0.00	0.00
	I				11	7	30	416.9	-11	71	0.36	7.37	87.6	0.09	0.18	0.18	222.9	0.67	1.33	1.34
	II				3	4						20.83	125.6							

APPENDIX XIII. WINTER POPULATION ESTIMATES OF JUVENILE COHO SALMON IN THE TRIBUTARIES "T" AND SWAMPS (NORTH OR SOUTH SIDE) THAT ENTER CARNATION CREEK (SEE FIG.2 FOR LOCATIONS). THE TRIBUTARY DATA WERE DIVIDED INTO LOWER "L" AND UPPER "U" SECTIONS OR IT WAS COMBINED FOR "ALL" SECTIONS. NUMBER OF FISH ARE SHOWN AS MARKS (M) AVAIABLE FOR CAPTURE AND AS CATCH (C2) AND RECAPTURED MARKS (R) DURING THE SECOND SAMPLING. THE WETTED AREA CONSISTED ONLY OF POOL HABITAT.

SEC	AGE	AREA (SQ.M) WET	RIF	SEC LEN (M)	NUMBER FISH M	C2	R	POP EST N	STD. ERR. N	95 % CONF.LIM LOW	UP	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	RIF	POOL	WETTED TOT.WT (GM)	GM./SQ.M WET	RIF	POOL
Feb 16 - 25/87																				
T75@	I	976	@	15@	32	4@	18	71	23.34	25	117	7.5@	88.2	@.@7	@.@@	@.@7	534.1	@.55	@.@@	@.55
	II				1	1	@					15.81	118.@							
T16L	I	1144	@	265	66	59	16	236	289.38	-174	647	5.56	88.2	@.21	@.@@	@.21	1314.8	1.15	@.@@	1.15
	II				1	@	@					11.28	183.@							
T16U	I	816	@	228	31	15	6	73	118.47	-143	298	6.82	85.6	@.@9	@.@@	@.@9	498.8	@.61	@.@@	@.61
	II				1	@	@					14.44	114.@							
T26ALL	I	2465	@	388	18	13	7	33	22.49	-11	77	9.25	94.3	@.@1	@.@@	@.@1	307.6	@.12	@.@@	@.12
	II				12	1@	4	29	26.44	-23	8@	11.96	185.5	@.@1	@.@@	@.@1	342.1	@.14	@.@@	@.14
N15@	I	5@2	@	18@	33	2@	18	52	16.44	2@	84	5.47	8@.2	@.1@	@.@@	@.1@	283.9	@.57	@.@@	@.57
	II				@	1	@					11.82	185.@							
S15@	I	1451	@	175	82	93	27	279	144.26	-4	561	5.51	79.6	@.19	@.@@	@.19	1535.3	1.@6	@.@@	1.@6
	II				1	1	@					12.4@	187.@							
ALL	I	7354	@	1298	262	24@	92	7@4	19@.91	33@	1@78	6.12	82.3	@.1@	@.@@	@.1@	4366.7	@.59	@.@@	@.59
	II				16	13	4	48	6@.14	-7@	165	12.67	187.@	@.@1	@.@@	@.@1	6@3.@	@.@@	@.@@	@.@@
Feb 22 - 28/88																				
T75@	I	976	@	15@	9@	9@	35	25@	95.58	63	438	4.42	75.6	@.26	@.@@	@.26	1166.1	1.13	@.@@	1.13
T16L	I	1144	@	265	231	277	14@	457	52.44	355	56@	3.2@	66.7	@.4@	@.@@	@.4@	1463.7	1.28	@.@@	1.28
T16U	I	816	@	228	72	72	4@	13@	29.42	72	188	4.18	74.@	@.16	@.@@	@.16	543.3	@.67	@.@@	@.67
T26L	I	1688	@	228	164	166	82	332	62.2@	21@	454	4.79	77.@	@.2@	@.@@	@.2@	1598.2	@.94	@.@@	@.94
	II				2	@	@					11.37	11@.@							
T26U	I	777	@	16@	37	37	16	85	39.49	8	162	4.63	77.3	@.11	@.@@	@.11	393.3	@.51	@.@@	@.51
S125	I	1693	@	18@	3	2	1	6	5.12	-4	16	@.1@	93.5	@.@@	@.@@	@.@@	48.6	@.@3	@.@@	@.@3
N15@	I	5@2	@	18@	78	67	36	145	43.21	61	23@	3.76	69.3	@.29	@.@@	@.29	545.9	1.@9	@.@@	1.@9
S15@	I	1451	@	175	132	19@	69	363	73.19	219	5@6	3.@@	65.9	@.25	@.@@	@.25	1117.7	@.77	@.@@	@.77
ALL	I	9@47	@	147@	@@7	9@9	419	1751	143.@2	147@	2@31	3.@3	7@.9	@.19	@.@@	@.19	6763.7	@.74	@.@@	@.74
	II				2	@	@					11.37	11@.@							

APPENDIX XIII. CONTINUED. WINTER OFF-CHANNEL JUVENILE COHO SALMON.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	NUMBER FISH M	NUMBER FISH C2	NUMBER FISH R	POP EST N	STD. ERR. N	95 % CONF.LIM LOW	95 % CONF.LIM UP	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT.WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
Jan 26 - Feb 1/89																				
T75B	I	976	0	150	93	68	25	249	163.22	-70	569	6.02	85.3	0.26	0.00	0.26	1701.3	1.74	0.00	1.74
	II				6	7	2	19	10.10	-17	54	11.10	102.4	0.02	0.00	0.02	200.7	0.21	0.00	0.21
T16L	I	1144	0	265	174	132	42	541	317.42	-81	1163	3.94	69.2	0.47	0.00	0.47	2132.6	1.86	0.00	1.86
	II				7	4	2	13	14.07	-16	42	11.01	100.0	0.01	0.00	0.01	146.0	0.13	0.00	0.13
T16U	I	016	0	220	56	34	10	105	63.29	-19	229	5.60	79.2	0.13	0.00	0.13	500.0	0.72	0.00	0.72
	II				3	1	0					10.93	100.0							
T26L	I	1000	0	220	140	120	04	290	73.49	152	440	5.03	79.5	0.10	0.00	0.10	1004.0	0.99	0.00	0.99
	II				0	7	2	19	10.10	-17	54	10.07	99.4	0.01	0.00	0.01	202.9	0.12	0.00	0.12
T26U	I	777	0	100	10	15	4	01	07.00	-110	231	5.00	00.0	0.00	0.00	0.00	350.3	0.40	0.00	0.40
	II				1	0	0					10.03	99.0							
S125	I	1003	0	100	20	29	7	109	123.29	-133	350	0.20	03.0	0.00	0.00	0.00	000.0	0.40	0.00	0.40
	II				3	7	1	10	13.03	-11	43	11.07	101.3	0.01	0.00	0.01	177.1	0.10	0.00	0.10
N150	I	502	0	100	143	102	70	342	03.57	210	407	5.07	77.5	0.00	0.00	0.00	1735.1	3.40	0.00	3.40
	II				5	3	2	0	0.12	-4	20	11.30	100.0	0.02	0.00	0.02	01.0	0.10	0.00	0.10
S155	I	1451	0	175	104	173	09	410	104.13	200	014	4.10	71.4	0.20	0.00	0.20	1700.2	1.10	0.00	1.10
	II				3	4	1	10	0.02	-7	27	10.01	90.0	0.01	0.00	0.01	100.1	0.07	0.00	0.07
ALL	I	0047	0	1470	024	701	305	2054	291.43	1403	2020	5.02	70.1	0.23	0.00	0.23	10311.7	1.14	0.00	1.14
	II				04	03	10	100	02.30	-73	209	10.05	100.1	0.01	0.00	0.01	1104.7	0.13	0.00	0.13
Jan 23 - Feb 4/90																				
T75B	I	976	0	150	109	114	00	270	50.41	155	304	4.49	75.9	0.20	0.00	0.20	1211.2	1.24	0.00	1.24
T16L	I	1144	0	265	00	130	39	337	110.90	104	570	3.02	70.5	0.29	0.00	0.29	1207.0	1.13	0.00	1.13
T16U	I	016	0	220	132	137	70	232	35.45	103	302	4.01	72.4	0.20	0.00	0.20	031.0	1.14	0.00	1.14
	II				0	1	0					10.50	100.0							
T26L	I	1000	0	220	24	30	7	07	03.70	-07	201	7.77	00.0	0.00	0.00	0.00	752.7	0.45	0.00	0.45
	II				1	0	0					13.00	111.0							
T26U	I	777	0	100	4	1	0					7.03	00.0							
S125	I	1003	0	100	70	100	44	100	43.20	105	275	5.02	00.0	0.11	0.00	0.11	1000.0	0.03	0.00	0.03
	II				0	4	3	0	5.02	-1	19	14.42	110.1	0.01	0.00	0.01	120.2	0.07	0.00	0.07
N150	I	502	0	100	100	110	41	203	100.02	05	400	4.01	74.0	0.50	0.00	0.50	1303.0	2.00	0.00	2.00
	II				1	0	0					13.40	112.0							
S155	I	1451	0	175	330	294	190	520	52.71	417	024	3.79	70.5	0.30	0.00	0.30	1972.7	1.30	0.00	1.30
	II				2	2	2	3	0.07	2	4	12.94	110.0	0.00	0.00	0.00	30.0	0.03	0.00	0.03
ALL	I	0047	0	1470	000	030	470	1070	140.55	1504	2107	4.40	74.3	0.21	0.00	0.21	0359.3	0.02	0.00	0.02
	II				10	7	5	15	7.75	-1	30	12.00	100.5	0.00	0.00	0.00	170.0	0.02	0.00	0.02

APPENDIX XIV. WINTER POPULATION ESTIMATES OF JUVENILE CUTTHROAT TROUT IN TRIBUTARIES "T" AND SWAMPS (NORTH OR SOUTH SIDE) THAT ENTER CARNATION CREEK (SFE FIG. 2 FOR LOCATIONS). THE TRIBUTARY DATA WERE DIVIDED INTO LOWER "L" AND UPPER "U" SECTIONS OR IT WAS COMBINED FOR "ALL" SECTIONS. NUMBER OF FISH ARE SHOWN AS MARKS AVAILABLE FOR CAPTURE (M) AND AS CATCH (C2) AND RECAPTURED MARKS (R) DURING THE SECOND SAMPLING.

SEC	AGE	AREA (SQ.M) WET	RIF	SEC LEN (M)	NUMBER FISH M	C2	R	POP EST N	STD. ERR. N	95 % CONF.LIM LOW	UP	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	RIF	POOL	WETTED TOT.WT (GM)	GM./SQ.M WET	RIF	POOL
Feb 16 - 25/87																				
T75B	II	976	0	150	1	0	0						126.0							
T16L	I	1144	0	265	17	31	6	82	68.44	-52	216		75.2	0.07	0.00	0.07				
	II				1	1	0						112.5							
T16U	I	816	0	220	3	2	1	6	5.12	-4	16		90.5	0.01	0.00	0.01				
T26ALL	I	2465	0	390	17	15	6	41	33.84	-24	106		81.3	0.02	0.00	0.02				
	II				11	4	1	30	95.21	-157	217		116.1	0.01	0.00	0.01				
	III				4	0	0						149.7							
S15S	I	1451	0	175	1	1	1	1	0.00	1	1		86.0	0.00	0.00	0.00				
ALL	I	6852	0	1190	38	48	14	127	76.42	-22	277		78.3	0.02	0.00	0.02				
	II				13	5	1	42	157.57	-267	351		115.6	0.01	0.00	0.01				
	III				4	0	0						149.7							
Feb 22 - 28/88																				
T16L	I	1144	0	265	15	12	3	52	85.46	-116	220	3.72	72.4	0.05	0.00	0.05	193.4	0.17	0.00	0.17
	II				0	1	0					12.66	113.0							
T26L	I	1688	0	220	3	0	2	12	5.70	1	23	2.78	65.8	0.01	0.00	0.01	33.4	0.02	0.00	0.02
	II				15	13	6	32	22.19	-11	75	15.33	119.0	0.02	0.00	0.02	490.6	0.29	0.00	0.29
	III				0	1	0					27.00	140.0							
T26U	I	777	0	160	4	14	4	15	4.33	7	23	2.14	60.8	0.02	0.00	0.02	32.1	0.04	0.00	0.04
	II				5	4	1	15	21.60	-27	57	10.38	105.0	0.02	0.00	0.02	155.7	0.20	0.00	0.20
	III				0	2	0					37.50	157.0							
S15S	II	1451	0	175	1	1	1	2	0.50	1	3	14.00	117.0	0.00	0.00	0.00	28.0	0.02	0.00	0.02
ALL	I	5068	0	820	22	34	9	81	50.64	-19	180	3.07	67.7	0.02	0.00	0.02	247.1	0.05	0.00	0.05
	II				21	19	8	49	33.33	-16	114	13.42	114.3	0.01	0.00	0.01	656.1	0.13	0.00	0.13
	III				0	3	0					29.82	144.5							
Jan 26 - Feb 1/89																				
T16L	I	1144	0	265	15	14	0						69.7							
	II				2	1	0						100.3							
T26L	I	1688	0	220	21	18	7	52	42.95	-32	136		76.7	0.03	0.00	0.03				
	II				11	7	1	48	152.39	-251	347		114.3	0.03	0.00	0.03				
	III				1	0	0						147.0							
T26U	I	777	0	160	6	5	2	14	13.42	-12	40		79.3	0.02	0.00	0.02				
	II				3	3	1	8	6.87	-5	21		115.0	0.01	0.00	0.01				
N15B	I	502	0	100	1	0	0						70.0							
S15S	I	1451	0	175	4	1	0						62.8							
ALL	I	5562	0	920	47	38	9	187	259.52	-321	696		73.0	0.03	0.00	0.03				
	II				16	11	2	68	179.96	-285	421		110.8	0.01	0.00	0.01				
	III				1	0	0						147.0							

APPENDIX XIV. CONTINUED. WINTER OFF-CHANNEL JUVENILE CUTTHROAT TROUT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	NUMBER FISH M	NUMBER FISH C2	NUMBER FISH R	POP EST N	STD. ERR. N	95 % CONF.LIM LOW	95 % CONF.LIM UP	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT.WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
Jan 23 - Feb 4/90																				
T16L	I	1144	0	265	3	3	0					6.26	86.5							
	II				2	1	0					12.00	112.3							
T26L	I	1688	0	220	16	13	4	48	60.14	-70	165	5.59	83.0	0.03	0.00	0.03	266.1	0.16	0.00	0.16
	II				39	32	12	102	76.83	-49	252	15.42	117.3	0.06	0.00	0.06	1565.7	0.93	0.00	0.93
	III				1	0	0					40.85	162.0							
T26U	I	777	0	160	14	11	2	60	138.79	-212	332	5.12	77.4	0.08	0.00	0.08	307.2	0.40	0.00	0.40
	II				3	1	1	4	3.35	-3	11	20.63	126.3	0.01	0.00	0.01	82.5	0.11	0.00	0.11
ALL	I	3609	0	645	33	27	6	136	222.43	-300	572	5.67	82.4	0.04	0.00	0.04	771.3	0.21	0.00	0.21
	II				44	34	13	113	86.24	-57	282	14.62	116.2	0.03	0.00	0.03	1644.4	0.46	0.00	0.46
	III				1	0	0					40.85	162.0							

APPENDIX XV. WINTER POPULATION ESTIMATES OF JUVENILE RAINBOW TROUT IN THE LOWER "L" SECTION OF TRIBUTARY 1600 "T16" AND TRIBUTARY 2600 "T26" OF CARNATION CREEK (SEE FIG. 2 FOR LOCATIONS). DATA WERE ALSO COMBINED FOR "ALL" SECTIONS. WETTED AREA WAS EXCLUSIVELY POOL HABITAT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	NUMBER FISH M	NUMBER FISH C2	NUMBER FISH R	POP EST N	STD. ERR. N	95 % CONF.LIM LOW	95 % CONF.LIM UP	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT.WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
Feb 16 - 25/87																				
T16L	I	1144	0	265	1	0	0						80.0							
T26ALL	I	2465	0	380	0	1	0						111.0							
	II				2	0	0						147.5							
ALL	I	3609	0	645	1	1	0						95.5							
	II				2	0	0						147.5							
Jan 26 - Feb 1/89																				
T16L	I	1144	0	265	19	9	2	67	209.47	-344	477		78.7	0.06	0.00	0.06				

APPENDIX XVI. Summaries from 1987 fork length data of juvenile fish caught in Carnation Creek. Locations included data for the counting "FENCE", for study sections, or for "ALL" (II-VIII) sections. The fish were caught by combinations of trapping "TR", electroshocking "S", and pole seining "PS".

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
87 Mar 13	FENCE	TR	CHUM	0	18	38.61	2.725	37.26	39.97	34	42
87 Mar 25	FENCE	TR	CHUM	0	63	42.44	0.964	42.20	42.69	38	44
87 Mar 29	FENCE	TR	CHUM	0	51	43.00	0.721	42.80	43.20	42	45
87 Apr 05	FENCE	TR	CHUM	0	52	42.02	0.874	41.78	42.26	41	45
87 Apr 08	FENCE	TR	CHUM	0	50	41.88	0.627	41.70	42.06	41	44
87 Apr 18	FENCE	TR	CHUM	0	50	42.14	0.700	41.94	42.34	40	44
87 Apr 21	FENCE	TR	CHUM	0	50	41.82	0.691	41.62	42.02	41	43
87 Mar 07	FENCE	TR	COHO	0	54	36.13	1.467	35.73	36.53	32	39
87 Mar 07	FENCE	TR	COHO	1	4	83.00	6.683	72.37	93.63	77	92
87 Mar 11	FENCE	TR	COHO	1	4	84.25	6.238	74.33	94.17	76	91
87 Mar 17	FENCE	TR	COHO	0	28	36.14	1.919	35.40	36.89	32	40
87 Mar 18	FENCE	TR	COHO	1	11	80.45	9.267	74.22	86.69	71	100
87 Mar 25	FENCE	TR	COHO	1	43	80.05	7.381	77.78	82.31	67	102
87 Mar 27	FENCE	TR	COHO	0	42	33.88	1.468	33.43	34.34	32	38
87 Apr 01	FENCE	TR	COHO	1	114	86.85	8.919	85.20	88.50	61	112
87 Apr 05	FENCE	TR	COHO	0	66	35.33	1.533	34.96	35.71	30	38
87 Apr 08	FENCE	TR	COHO	0	100	34.53	2.706	33.99	35.07	30	40
87 Apr 08	FENCE	TR	COHO	1	290	89.39	9.618	88.28	90.50	69	115
87 Apr 08	FENCE	TR	COHO	2	10	117.50	14.804	106.92	128.08	103	143
87 Apr 15	FENCE	TR	COHO	1	73	93.10	9.905	90.79	95.40	76	115
87 Apr 15	FENCE	TR	COHO	2	9	111.33	7.211	105.78	116.89	101	124
87 Apr 17	FENCE	TR	COHO	0	54	34.15	1.559	33.72	34.57	33	39
87 Apr 22	FENCE	TR	COHO	0	15	34.73	2.251	33.49	35.98	33	41
87 Apr 22	FENCE	TR	COHO	1	508	92.62	7.811	91.94	93.30	65	111
87 Apr 22	FENCE	TR	COHO	2	74	109.93	7.822	108.12	111.74	95	127
87 Apr 29	FENCE	TR	COHO	1	734	92.97	7.379	92.43	93.50	73	110
87 Apr 29	FENCE	TR	COHO	2	105	112.76	10.972	110.64	114.88	97	175
87 May 05	FENCE	TR	COHO	0	12	41.08	3.777	38.68	43.48	35	49
87 May 06	FENCE	TR	COHO	1	285	92.15	7.039	91.33	92.96	71	110
87 May 06	FENCE	TR	COHO	2	24	113.67	7.591	110.46	116.87	98	127
87 May 11	FENCE	TR	COHO	0	17	41.29	4.579	38.94	43.65	37	52
87 May 13	FENCE	TR	COHO	1	143	92.74	6.781	91.63	93.85	78	112
87 May 13	FENCE	TR	COHO	2	5	120.00	5.477	113.19	126.81	114	128
87 May 14	FENCE	TR	COHO	0	22	41.41	3.960	39.65	43.17	34	51
87 May 20	FENCE	TR	COHO	1	52	89.40	6.225	87.68	91.13	78	109
87 May 20	FENCE	TR	COHO	2	3	124.67	13.429	91.33	158.01	115	140
87 May 27	FENCE	TR	COHO	1	8	82.13	8.391	75.12	89.13	63	91
87 May 29	FENCE	TR	COHO	0	64	45.38	4.706	44.20	46.55	33	56
87 Jun 03	FENCE	TR	COHO	1	2	91.50	3.536	59.72	123.28	89	94
87 Jun 15	FENCE	TR	COHO	0	19	48.32	5.774	45.53	51.10	41	58
87 Jun 26	FENCE	TR	COHO	0	14	50.50	6.779	46.59	54.41	44	65

APPENDIX XVI. CONTINUED. Fish length data for Carnation Creek (1987).

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
87 May 26	II	SPS	COHO	0	101	49.42	6.322	48.17	50.66	38	65
87 May 26	II	SPS	COHO	1	2	66.00	1.414	53.29	78.71	65	67
87 May 27	III	SPS	COHO	0	130	46.60	4.831	45.77	47.43	37	62
87 May 27	III	SPS	COHO	1	1	70.00					
87 May 28	IV	SPS	COHO	0	211	44.48	4.373	43.89	45.07	33	60
87 May 28	V	SPS	COHO	0	111	45.89	3.776	45.18	46.60	39	58
87 May 28	V	SPS	COHO	1	1	85.00					
87 May 27	VI	SPS	COHO	0	71	48.52	3.946	47.59	49.45	40	59
87 May 27	VI	SPS	COHO	1	1	62.00					
87 May 27	VIII	SPS	COHO	0	258	47.81	3.371	47.40	48.22	40	57
87 Sep 15	II	SPS	COHO	0	166	60.98	5.710	60.11	61.85	50	82
87 Sep 15	II	SPS	COHO	1	10	79.40	3.565	76.85	81.95	76	84
87 Sep 16	III	PS	COHO	0	123	64.33	6.111	63.25	65.41	51	83
87 Sep 16	III	PS	COHO	1	9	82.11	4.076	78.97	85.25	76	89
87 Sep 16	IV	SPS	COHO	0	255	55.02	6.895	54.17	55.86	41	73
87 Sep 16	IV	SPS	COHO	1	4	79.25	4.573	71.98	86.52	76	86
87 Sep 15	V	SPS	COHO	0	110	58.73	6.837	57.44	60.02	43	75
87 Sep 15	V	SPS	COHO	1	3	83.33	10.970	56.10	110.57	77	96
87 Sep 15	VI	SPS	COHO	0	99	62.58	5.101	61.56	63.59	52	75
87 Sep 15	VI	SPS	COHO	1	7	79.43	4.467	75.29	83.56	75	88
87 Sep 14	VIII	SPS	COHO	0	143	64.85	3.698	64.25	65.46	57	76
87 Sep 14	VIII	SPS	COHO	1	7	77.86	2.268	75.76	79.96	74	81
87 May 28	V	SPS	RBT	1	1	90.00					
87 Sep 15	II	SPS	RBT	0	1	79.00					
87 Sep 16	IV	SPS	RBT	0	2	66.50	3.536	34.72	98.28	64	69
87 Sep 15	V	SPS	RBT	0	5	62.40	7.797	52.71	72.09	53	70
87 Sep 15	V	SPS	RBT	2	1	143.00					
87 Sep 15	V	SPS	RBT	3	1	156.00					
87 Sep 15	VI	SPS	RBT	0	6	60.33	2.338	57.88	62.79	56	62
87 Sep 15	VI	SPS	RBT	1	2	100.50	9.192	17.88	183.12	94	107
87 Sep 15	VIII	SPS	RBT	0	1	70.00					
87 May 27	ALL	SPS	CUT	0	13	31.15	0.987	30.56	31.75	29	32
87 May 27	ALL	SPS	CUT	1	13	91.15	5.984	87.54	94.77	82	100
87 May 27	ALL	SPS	CUT	2	6	126.83	21.047	104.75	148.92	97	151
87 Jun 04	Trib C	S	CUT	1	10	87.70	15.635	76.53	98.87	67	119
87 Jun 04	Trib C	S	CUT	2	1	134.00					
87 Jun 04	IX	S	CUT	1	19	79.00	20.859	68.95	89.05	58	124
87 Jun 04	IX	S	CUT	2	9	125.89	14.878	114.43	137.35	98	149
87 Jun 11	X	S	CUT	1	24	84.54	10.750	80.00	89.08	68	107
87 Jun 11	X	S	CUT	2	20	124.15	13.519	117.83	130.47	107	147
87 Jun 11	X	S	CUT	3	2	157.00	2.828	131.58	182.42	155	159
87 Sep 15	II	SPS	CUT	1	4	101.75	13.841	79.74	123.76	87	120
87 Sep 16	III	PS	CUT	0	1	73.00					
87 Sep 16	III	PS	CUT	1	2	108.50	4.950	64.01	152.99	105	112
87 Sep 16	IV	SPS	CUT	0	3	71.67	4.726	59.93	83.40	68	77
87 Sep 16	IV	SPS	CUT	1	2	105.00	8.485	28.74	181.26	99	111
87 Sep 16	IV	SPS	CUT	2	2	136.00	1.414	123.29	148.71	135	137

APPENDIX XVI. CONTINUED. Fish length data for Carnation Creek (1987).

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
87 Sep 15	V	SPS	CUT	0	46	63.07	5.105	61.55	64.58	52	73
87 Sep 15	V	SPS	CUT	1	2	119.50	3.536	87.72	151.28	117	122
87 Sep 15	V	SPS	CUT	3	1	196.00					
87 Sep 15	VI	SPS	CUT	0	94	64.06	3.275	63.39	64.73	51	73
87 Sep 15	VI	SPS	CUT	1	4	99.75	15.108	75.73	123.77	80	116
87 Sep 15	VI	SPS	CUT	2	2	133.50	9.192	50.88	216.12	127	140
87 Sep 14	VIII	SPS	CUT	0	3	61.33	4.509	50.14	72.53	57	66
87 Sep 14	VIII	SPS	CUT	1	1	91.00					
87 Sep 14	Trib C	S	CUT	0	12	50.83	7.297	46.20	55.47	43	65
87 Sep 14	Trib C	S	CUT	1	8	107.50	15.892	94.24	120.76	87	133
87 Sep 14	Trib C	S	CUT	2	1	142.00					
87 Sep 14	Trib C	S	CUT	3	1	155.00					
87 Sep 17	IX	S	CUT	0	23	49.74	3.922	48.05	51.43	44	57
87 Sep 17	IX	S	CUT	1	36	87.31	14.162	82.51	92.10	67	131
87 Sep 17	IX	S	CUT	2	9	126.89	17.510	113.41	140.37	105	160
87 Sep 17	IX	S	CUT	3	1	163.00					
87 Sep 17	X	S	CUT	0	38	46.58	7.077	44.26	48.90	28	58
87 Sep 17	X	S	CUT	1	28	94.64	9.941	90.79	98.49	78	115
87 Sep 17	X	S	CUT	2	16	130.44	10.745	124.72	136.16	118	149
87 Sep 17	X	S	CUT	3	1	163.00					
87 May 26	II	SPS	ALUT	-	22	70.68	13.425	64.73	76.64	45	93
87 May 27	III	SPS	ALUT	-	11	77.55	18.630	65.02	90.07	53	105
87 May 28	IV	SPS	ALUT	-	6	94.33	10.250	83.58	105.09	80	110
87 May 28	V	SPS	ALUT	-	16	87.69	13.812	80.33	95.04	59	113
87 May 27	VI	SPS	ALUT	-	10	92.70	15.355	81.73	103.67	64	116
87 May 27	VIII	SPS	ALUT	-	3	101.67	8.387	80.85	122.49	92	107
87 Sep 15	II	SPS	ALUT	-	19	74.11	10.349	69.12	79.09	54	93
87 Sep 16	III	PS	ALUT	-	4	60.25	6.551	49.83	70.67	52	68
87 Sep 16	IV	SPS	ALUT	-	8	94.38	13.405	83.19	105.56	73	111
87 Sep 15	V	SPS	ALUT	-	3	93.00	8.185	72.68	113.32	84	100
87 Sep 15	VI	SPS	ALUT	-	5	95.60	13.557	78.74	112.46	75	109
87 May 26	II	SPS	ASPR	-	6	90.17	11.427	78.18	102.16	74	102
87 May 27	III	SPS	ASPR	-	4	105.25	10.372	88.76	121.74	92	117
87 May 27	IV	SPS	ASPR	-	1	145.00					
87 Sep 15	II	SPS	ASPR	-	4	90.75	8.180	77.74	103.76	83	102
87 Sep 16	IV	SPS	ASPR	-	1	101.00					

APPENDIX XVII. Summaries obtained from 1988 fork length data of juvenile fish from Carnation Creek. Locations include the counting "FENCE", study sections, and "ALL" (II-VIII) sections combined.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
88 Mar 9	FENCE	TR	CHUM	0	9	39.67	2.121	38.03	41.30	36	43
88 Mar 24	FENCE	TR	CHUM	0	19	42.05	0.911	41.61	42.49	40	44
88 Mar 26	FENCE	TR	CHUM	0	50	42.14	1.863	41.61	42.67	38	45
88 Mar 30	FENCE	TR	CHUM	0	50	42.30	1.729	41.81	42.79	38	46
88 Apr 7	FENCE	TR	CHUM	0	100	41.74	1.618	41.42	42.06	39	45
88 Mar 9	FENCE	TR	COHO	0	28	36.54	0.962	36.16	36.91	35	38
88 Mar 20	FENCE	TR	COHO	0	36	34.67	0.828	34.39	34.95	33	37
88 Mar 24	FENCE	TR	COHO	0	86	36.70	1.688	36.34	37.06	32	40
88 Apr 7	FENCE	TR	COHO	0	70	37.23	1.746	36.81	37.64	33	42
88 Mar 9	FENCE	TR	COHO	1	8	67.50	8.685	60.25	74.75	50	76
88 Mar 16	FENCE	TR	COHO	1	16	74.25	8.851	69.54	78.96	63	90
88 Mar 23	FENCE	TR	COHO	1	11	73.73	8.844	67.78	79.67	63	93
88 Mar 30	FENCE	TR	COHO	1	39	74.15	7.541	71.71	76.59	62	90
88 Apr 6	FENCE	TR	COHO	1	74	80.18	13.078	77.15	83.20	60	117
88 Apr 13	FENCE	TR	COHO	1	516	78.74	10.410	77.85	79.64	53	116
88 Apr 20	FENCE	TR	COHO	1	328	82.43	9.450	81.41	83.45	61	108
88 Apr 27	FENCE	TR	COHO	1	511	86.11	9.567	85.28	86.94	62	113
88 May 4	FENCE	TR	COHO	1	415	84.70	7.887	83.94	85.46	62	106
88 May 11	FENCE	TR	COHO	1	434	86.03	7.451	85.32	86.73	61	107
88 May 18	FENCE	TR	COHO	1	164	85.79	7.824	84.60	86.99	61	105
88 May 25	FENCE	TR	COHO	1	84	85.49	7.143	83.94	87.04	70	110
88 Jun 1	FENCE	TR	COHO	1	27	89.07	6.545	86.48	91.67	80	101
88 Jun 8	FENCE	TR	COHO	1	12	85.42	4.441	82.60	88.24	77	92
88 Mar 23	FENCE	TR	COHO	2	3	111.33	12.897	79.32	143.35	97	122
88 Mar 30	FENCE	TR	COHO	2	1	96.00					
88 Apr 6	FENCE	TR	COHO	2	3	103.33	7.572	84.54	122.13	98	112
88 Apr 13	FENCE	TR	COHO	2	5	102.60	7.925	92.75	112.45	95	112
88 Apr 20	FENCE	TR	COHO	2	9	109.11	3.257	106.60	111.62	104	114
88 May 4	FENCE	TR	COHO	2	4	107.50	3.873	101.34	113.66	104	113
88 May 11	FENCE	TR	COHO	2	2	116.00	2.828	90.58	141.42	114	118
88 Jun 8	II	SPS	COHO	0	32	56.16	6.933	53.67	58.64	45	70
88 Jun 9	III	SPS	COHO	0	69	52.26	4.546	51.17	53.35	44	65
88 Jun 9	III	SPS	COHO	1	3	78.00	3.606	69.05	86.95	75	82
88 Jun 8	IV	SPS	COHO	0	262	48.84	3.653	48.40	49.29	40	60
88 Jun 8	IV	SPS	COHO	1	12	73.50	5.000	70.32	76.68	67	82
88 Jun 7	V	SPS	COHO	0	35	51.00	4.087	49.60	52.40	44	60
88 Jun 7	V	SPS	COHO	1	6	71.17	4.355	66.60	75.74	67	77
88 Jun 7	VI	SPS	COHO	0	15	51.40	5.011	48.63	54.17	45	60
88 Jun 7	VI	SPS	COHO	1	2	82.00	5.657	31.16	132.84	78	86
88 Jun 7	VIII	SPS	COHO	0	112	47.17	4.221	46.38	47.96	40	60
88 Jun 7	VIII	SPS	COHO	1	2	80.50	2.121	61.44	99.57	79	82
88 Sep 13	II	SPS	COHO	0	87	74.92	6.214	73.59	76.25	61	90
88 Sep 13	II	SPS	COHO	1	6	90.17	2.639	87.40	92.94	88	95
88 Sep 13	III	SPS	COHO	0	94	76.49	6.574	75.15	77.83	63	89
88 Sep 13	III	SPS	COHO	1	1	95.00					
88 Sep 14	IV	SPS	COHO	0	252	61.13	6.734	60.30	61.96	46	78
88 Sep 14	IV	SPS	COHO	1	15	84.67	4.419	82.23	87.11	79	95

APPENDIX XVII. CONTINUED. Fish length data for 1988.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
88 Sep 14	V	SPS	COHO	0	70	68.09	7.023	66.42	69.76	41	79
88 Sep 14	V	SPS	COHO	1	13	81.92	3.328	79.91	83.94	79	88
88 Sep 14	VI	SPS	COHO	0	59	72.44	5.712	70.95	73.93	57	82
88 Sep 14	VI	SPS	COHO	1	4	88.75	4.193	82.08	95.42	86	95
88 Sep 12	VIII	SPS	COHO	0	143	67.31	5.342	66.44	68.19	54	82
88 Jun 8	ALL	SPS	RBT	1	6	98.83	7.223	91.26	106.41	90	110
88 Jun 8	ALL	SPS	RBT	2	2	125.00	5.657	74.16	175.84	121	129
88 Sep 13	II	SPS	RBT	1	2	119.50	7.778	49.60	189.40	114	125
88 Sep 13	III	SPS	RBT	1	1	106.00					
88 Sep 14	IV	SPS	RBT	0	9	67.22	4.684	63.62	70.83	63	78
88 Sep 14	IV	SPS	RBT	1	3	96.33	4.041	86.30	106.37	92	100
88 Sep 14	V	SPS	RBT	0	77	55.77	4.013	54.86	56.68	41	66
88 Sep 14	V	SPS	RBT	1	3	103.67	4.619	92.20	115.13	101	109
88 Sep 14	VI	SPS	RBT	0	57	67.30	4.551	66.09	68.50	59	78
88 Sep 14	VI	SPS	RBT	1	4	107.75	15.108	83.73	131.77	89	126
88 Sep 12	VIII	SPS	RBT	0	29	58.31	8.089	55.23	61.39	40	75
88 Sep 12	VIII	SPS	RBT	1	2	99.00	5.657	48.16	149.84	95	103
88 Jun 8	ALL	SPS	CUT	0	2	28.00	0.000	28.00	28.00	28	28
88 Jun 8	ALL	SPS	CUT	1	1	116.00					
88 Sep 13	ALL	SPS	CUT	0	2	63.50	2.121	44.44	82.57	62	65
88 Sep 13	ALL	SPS	CUT	1	3	101.33	11.590	72.56	130.11	88	109
88 Sep 13	ALL	SPS	CUT	2	2	157.00	5.657	106.16	207.84	153	161
88 Sep 13	ALL	SPS	CUT	3	1	185.00					
88 Jun 8	II	SPS	ALUT		23	75.83	17.082	68.45	83.20	41	104
88 Jun 9	III	SPS	ALUT		7	78.86	13.619	66.25	91.47	64	105
88 Jun 8	IV	SPS	ALUT		5	105.80	13.461	89.06	122.54	86	118
88 Jun 7	V	SPS	ALUT		2	101.50	6.364	44.30	158.70	97	106
88 Jun 7	VI	SPS	ALUT		6	87.00	10.020	76.49	97.51	81	107
88 Jun 9	VIII	SPS	ALUT		3	112.67	3.055	105.08	120.25	110	116
88 Sep 13	II	SPS	ALUT		25	60.60	13.961	54.85	66.35	44	87
88 Sep 13	III	SPS	ALUT		12	70.75	11.194	63.64	77.86	55	85
88 Sep 14	IV	SPS	ALUT		7	93.86	14.334	80.58	107.13	73	112
88 Sep 14	V	SPS	ALUT		13	94.38	11.522	87.42	101.35	68	111
88 Sep 14	VI	SPS	ALUT		2	93.00	11.314	-8.68	194.68	85	101
88 Jun 8	II	SPS	ASPR		3	112.67	3.055	105.08	120.25	110	116
88 Sep 13	II	SPS	ASPR		5	97.00	26.029	64.64	129.36	71	139
88 Sep 13	III	SPS	ASPR		4	118.75	19.670	87.47	150.03	95	139
88 Jun 9	Trib C	S	CUT	1	11	85.36	17.772	73.41	97.31	65	115
88 Jun 9	Trib C	S	CUT	2	2	136.00	8.485	59.74	212.26	130	142
88 Sep 16	Trib C	S	CUT	0	18	49.28	6.515	46.04	52.52	39	62
88 Sep 16	Trib C	S	CUT	1	11	106.64	16.657	95.44	117.84	89	134
88 Sep 16	Trib C	S	CUT	2	1	161.00					
88 Jun 16	IX	S	CUT	1	32	89.38	15.462	83.83	94.92	65	117
88 Jun 16	IX	S	CUT	2	4	127.50	20.339	95.16	159.84	104	145
88 Sep 15	IX	S	CUT	0	10	53.40	4.033	50.52	56.28	49	60
88 Sep 15	IX	S	CUT	1	29	100.97	13.720	95.74	106.19	80	132
88 Jun 16	X	S	CUT	1	36	87.53	17.790	81.51	93.55	56	122
88 Jun 16	X	S	CUT	2	7	118.43	11.603	107.68	129.17	107	133
88 Sep 15	X	S	CUT	0	51	50.75	4.147	49.58	51.91	41	59
88 Sep 15	X	S	CUT	1	23	101.65	14.008	95.61	107.70	83	127

APPENDIX XVIII. Summaries obtained from 1989 fork length data of juvenile fish from Carnation Creek. Locations included the counting "FENCE", study sections, and "ALL" (II-VIII) sections. Traps "TR", electroshockers "S", and pole seines "PS" were used to captured the fish.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
89 Mar 12	FENCE	TR	CHUM	0	67	39.31	1.384	38.98	39.65	35	42
89 Mar 20	FENCE	TR	CHUM	0	94	40.67	1.140	40.44	40.90	39	43
89 Mar 26	FENCE	TR	CHUM	0	50	41.12	1.662	40.65	41.59	36	44
89 Apr 2	FENCE	TR	CHUM	0	50	40.74	1.157	40.41	41.07	39	43
89 Apr 9	FENCE	TR	CHUM	0	50	41.44	1.013	41.15	41.73	40	44
89 Apr 16	FENCE	TR	CHUM	0	60	40.15	1.313	39.81	40.49	37	43
89 Apr 21	FENCE	TR	CHUM	0	45	40.29	0.991	39.99	40.59	38	42
89 Apr 29	FENCE	TR	CHUM	0	41	41.90	2.278	41.18	42.62	39	46
89 Mar 14	FENCE	TR	COHO	0	17	38.29	1.759	37.39	39.20	35	40
89 Mar 26	FENCE	TR	COHO	0	52	38.77	0.983	38.50	39.04	36	40
89 Apr 2	FENCE	TR	COHO	0	50	36.88	1.081	36.57	37.19	35	39
89 Apr 10	FENCE	TR	COHO	0	78	37.63	1.021	37.40	37.86	35	40
89 Apr 22	FENCE	TR	COHO	0	61	36.28	1.392	35.92	36.64	34	43
89 Jul 1	FENCE	TR	COHO	0	25	53.60	2.141	52.72	54.48	51	59
89 Mar 8	FENCE	TR	COHO	1	4	69.50	4.509	62.33	76.67	63	73
89 Mar 15	FENCE	TR	COHO	1	2	68.00	9.899	-20.97	156.97	61	75
89 Mar 22	FENCE	TR	COHO	1	14	74.93	6.183	71.36	78.50	65	85
89 Mar 29	FENCE	TR	COHO	1	16	73.25	10.227	67.80	78.70	55	90
89 Apr 5	FENCE	TR	COHO	1	52	77.46	5.849	75.84	79.08	64	92
89 Apr 12	FENCE	TR	COHO	1	56	82.04	9.027	79.62	84.45	66	105
89 Apr 19	FENCE	TR	COHO	1	409	89.42	10.155	88.44	90.41	63	112
89 Apr 26	FENCE	TR	COHO	1	1016	92.19	9.532	91.61	92.78	64	119
89 May 3	FENCE	TR	COHO	1	1183	91.48	8.503	90.99	91.96	66	124
89 May 10	FENCE	TR	COHO	1	454	89.58	7.466	88.89	90.27	70	110
89 May 17	FENCE	TR	COHO	1	93	87.51	6.010	86.27	88.74	74	102
89 May 24	FENCE	TR	COHO	1	184	92.80	7.231	91.76	93.85	74	114
89 May 29	FENCE	TR	COHO	1	29	93.55	4.618	91.79	95.31	83	101
89 Jun 20	FENCE	TR	COHO	1	8	99.00	5.529	94.39	103.61	92	107
89 Jul 1	FENCE	TR	COHO	1	7	100.86	5.398	95.86	105.86	92	108
89 Mar 8	FENCE	TR	COHO	2	2	83.50	0.707	77.15	89.86	83	84
89 Mar 15	FENCE	TR	COHO	2	1	90.00					
89 Mar 22	FENCE	TR	COHO	2	4	90.00	9.899	74.26	105.74	80	99
89 Mar 29	FENCE	TR	COHO	2	3	95.67	13.577	61.96	129.37	80	104
89 Apr 5	FENCE	TR	COHO	2	4	108.50	8.851	94.43	122.57	100	118
89 Apr 12	FENCE	TR	COHO	2	3	105.33	6.028	90.37	120.30	99	111
89 Apr 19	FENCE	TR	COHO	2	44	106.34	6.928	104.24	108.44	96	121
89 Apr 26	FENCE	TR	COHO	2	66	109.55	7.413	107.73	111.36	98	127
89 May 3	FENCE	TR	COHO	2	78	105.63	9.359	103.52	107.74	89	128
89 May 10	FENCE	TR	COHO	2	29	101.38	10.112	97.53	105.23	89	122
89 May 17	FENCE	TR	COHO	2	2	108.50	0.707	102.15	114.86	108	109
89 May 24	FENCE	TR	COHO	2	30	97.97	10.060	94.22	101.71	87	135
89 May 29	FENCE	TR	COHO	2	3	108.00	4.359	97.18	118.82	105	113
89 Jun 20	FENCE	TR	COHO	2	2	106.00	0.000	106.00	106.00	106	106
89 Jul 1	FENCE	TR	COHO	2	4	115.00	4.082	108.51	121.49	111	119

APPENDIX XVIII. CONTINUED. Fish length data for 1989.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
89 May 29	II	SPS	COHO	0	220	50.70	4.586	50.09	51.30	41	67
89 May 29	II	SPS	COHO	1	1	80.00					
89 May 30	III	SPS	COHO	0	207	47.89	4.869	47.23	48.56	39	65
89 May 30	IV	SPS	COHO	0	475	45.46	4.222	45.08	45.84	37	63
89 May 30	IV	SPS	COHO	1	9	77.78	4.790	74.09	81.47	71	86
89 May 29	V	SPS	COHO	0	149	48.66	3.430	48.11	49.22	40	60
89 May 29	V	SPS	COHO	1	1	65.00					
89 May 29	VI	SPS	COHO	0	129	48.44	3.475	47.84	49.04	40	58
89 May 29	VI	SPS	COHO	1	2	79.50	6.364	22.30	136.70	75	84
89 May 31	VIII	SPS	COHO	0	53	49.68	2.716	48.93	50.43	41	56
89 Sep 10	II	SPS	COHO	0	179	70.88	6.160	69.98	71.79	57	88
89 Sep 10	II	SPS	COHO	1	18	89.78	7.117	86.24	93.32	80	110
89 Sep 10	III	SPS	COHO	0	189	66.13	6.999	65.13	67.13	50	88
89 Sep 10	III	SPS	COHO	1	1	92.00					
89 Sep 12	IV	SPS	COHO	0	357	59.25	8.409	58.38	60.12	43	83
89 Sep 12	IV	SPS	COHO	1	11	85.55	3.328	83.31	87.78	82	91
89 Sep 12	V	SPS	COHO	0	131	65.79	6.217	64.72	66.85	47	83
89 Sep 12	V	SPS	COHO	1	1	87.00					
89 Sep 11	VI	SPS	COHO	0	145	68.97	4.929	68.16	69.77	55	85
89 Sep 11	VI	SPS	COHO	1	2	94.00	1.414	81.29	106.71	93	95
89 Sep 11	VIII	SPS	COHO	0	10	82.90	5.953	78.65	87.15	74	93
89 May 29	II	SPS	RBT	1	8	87.13	7.624	80.76	93.49	77	99
89 May 30	III	SPS	RBT	1	2	94.50	9.192	11.88	177.12	88	101
89 May 30	IV	SPS	RBT	1	2	90.50	12.021	-17.54	198.54	82	99
89 May 29	V	SPS	RBT	1	10	80.40	6.085	74.87	84.24	72	92
89 May 29	V	SPS	RBT	2	1	130.00					
89 May 29	V	SPS	RBT	3	1	183.00					
89 May 29	VI	SPS	RBT	1	15	83.00	4.796	80.35	85.65	75	95
89 May 31	VIII	SPS	RBT	1	1	92.00					
89 May 31	VIII	SPS	RBT	2	1	118.00					
89 Sep 10	II	SPS	RBT	1	3	105.67	3.786	96.27	115.07	103	110
89 Sep 10	III	SPS	RBT	1	1	82.00					
89 Sep 12	IV	SPS	RBT	1	5	99.20	13.142	82.86	115.54	81	118
89 Sep 12	V	SPS	RBT	1	7	96.29	5.376	91.31	101.26	88	104
89 Sep 12	V	SPS	RBT	2	1	148.00					
89 Sep 11	VI	SPS	RBT	1	14	[illegible]	7.010	94.67	102.76	88	111
89 Sep 11	VIII	SPS	RBT	1	5	7[illegible]0	8.367	66.60	87.40	70	90
89 May 30	ALL	SPS	CUT	1	8	87.50	13.670	76.09	98.91	66	112
89 May 30	ALL	SPS	CUT	2	6	110.67	25.781	83.62	137.72	88	145
89 Sep 11	ALL	SPS	CUT	1	9	104.22	7.645	98.34	110.11	93	114
89 Sep 11	ALL	SPS	CUT	2	3	157.67	24.111	97.81	217.52	135	183
89 May 29	II	SPS	ALUT		16	68.57	14.695	62.68	76.79	46	95
89 May 30	III	SPS	ALUT		12	75.58	13.581	66.96	84.21	61	102
89 May 30	IV	SPS	ALUT		6	100.00	7.668	91.95	108.05	90	112
89 May 29	V	SPS	ALUT		7	96.43	12.408	84.94	107.92	81	118
89 May 29	VI	SPS	ALUT		3	92.67	1.155	89.80	95.53	92	94

APPENDIX XVIII. CONTINUED. Fish length data for 1989.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
89 Sep 10	II	SPS	ALUT		40	70.32	13.110	66.14	74.51	50	106
89 Sep 10	III	SPS	ALUT		25	77.60	13.210	72.16	83.04	58	101
89 Sep 12	IV	SPS	ALUT		8	89.88	21.557	71.89	107.86	59	115
89 Sep 12	V	SPS	ALUT		13	84.38	11.398	77.49	91.28	64	108
89 Sep 11	VI	SPS	ALUT		3	105.67	5.132	92.93	118.41	100	110
89 Sep 11	VIII	SPS	ALUT		2	119.50	0.707	113.15	125.86	119	120
89 May 29	II	SPS	ASPR		1	97.00					
89 May 29	III	SPS	ASPR		2	99.00	22.627	-104.36	302.36	83	115
89 Sep 10	II	SPS	ASPR		4	111.00	4.082	104.51	117.49	106	117
89 Sep 10	III	SPS	ASPR		2	104.00	19.799	-73.94	281.94	90	118
89 May 28	Trib C	S	CUT	1	8	88.13	17.200	73.77	102.48	70	114
89 May 28	Trib C	S	CUT	2	2	137.50	17.678	-21.38	296.38	125	150
89 May 28	Trib C	S	CUT	3	1	177.00					
89 Sep 13	Trib C	S	CUT	0	19	60.58	7.290	57.07	64.09	48	75
89 Sep 13	Trib C	S	CUT	1	5	101.40	14.433	83.46	119.34	85	122
89 Sep 13	Trib C	S	CUT	2	1	154.00					
89 Sep 13	Trib C	S	CUT	3	1	190.00					
89 May 31	IX	S	CUT	1	18	83.11	8.697	78.79	87.44	70	98
89 May 31	IX	S	CUT	2	9	129.33	13.583	118.87	139.79	115	157
89 Sep 13	IX	S	CUT	0	84	49.99	6.093	48.67	51.31	35	63
89 Sep 13	IX	S	CUT	1	21	105.24	12.657	99.47	111.01	88	132
89 Sep 13	IX	S	CUT	2	3	146.33	14.012	111.55	181.12	135	162
89 Jun 1	X	S	CUT	1	17	86.65	15.720	78.56	94.73	69	120
89 Jun 1	X	S	CUT	2	7	125.00	10.440	115.33	134.67	113	142
89 Sep 13	X	S	CUT	0	31	55.71	6.634	53.28	58.14	44	69
89 Sep 13	X	S	CUT	1	19	113.47	11.428	107.97	118.98	94	132
89 Sep 13	X	S	CUT	2	6	144.83	12.561	131.65	158.01	138	170

APPENDIX XIX. Summaries of fork length data of juvenile fish caught in Carnation Creek during spring 1990. Locations included the counting "FENCE" and study sections (see Fig.1). Traps "TR", electroshockers "S", or pole seines "PS" were used.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
90 Mar 16	FENCE	TR	CHUM	0	12	41.08	1.379	40.21	41.96	38	43
90 Mar 21	FENCE	TR	CHUM	0	115	41.34	0.981	41.16	41.52	37	43
90 Apr 12	FENCE	TR	CHUM	0	16	42.69	0.946	42.18	43.19	41	45
90 Mar 17	FENCE	TR	COHO	0	39	35.82	1.467	35.35	36.29	32	40
90 Mar 20	FENCE	TR	COHO	0	52	36.25	0.988	35.98	36.52	34	38
90 Mar 21	FENCE	TR	COHO	0	182	36.34	0.918	36.20	36.47	33	38
90 Mar 22	FENCE	TR	COHO	0	287	36.51	0.848	36.41	36.60	34	38
90 Mar 23	FENCE	TR	COHO	0	90	36.51	0.838	36.34	36.69	35	39
90 Mar 24	FENCE	TR	COHO	0	162	36.69	0.768	36.57	36.80	35	40
90 Mar 27	FENCE	TR	COHO	0	96	37.16	1.019	36.95	37.36	35	41
90 Mar 29	FENCE	TR	COHO	0	140	37.76	0.889	37.61	37.90	33	40
90 Apr 3	FENCE	TR	COHO	0	199	37.38	1.220	37.21	37.55	33	40
90 Apr 6	FENCE	TR	COHO	0	139	36.86	1.456	36.62	37.11	32	40
90 Apr 18	FENCE	TR	COHO	0	49	36.80	1.414	36.39	37.20	34	39
90 Apr 25	FENCE	TR	COHO	0	32	36.38	2.044	35.64	37.11	33	42
90 May 26	FENCE	TR	COHO	0	11	47.91	6.188	43.75	52.07	37	56
90 Jun 13	FENCE	TR	COHO	0	47	50.66	4.077	49.46	51.85	41	59
90 Jun 19	FENCE	TR	COHO	0	27	55.26	3.859	53.73	56.79	47	63
90 Mar 2	FENCE	TR	COHO	1	10	71.20	4.517	67.97	74.43	62	79
90 Mar 7	FENCE	TR	COHO	1	14	73.07	5.850	69.69	76.45	65	85
90 Mar 14	FENCE	TR	COHO	1	104	73.90	6.593	72.71	75.27	61	95
90 Mar 21	FENCE	TR	COHO	1	218	75.09	6.487	74.23	75.95	59	93
90 Mar 28	FENCE	TR	COHO	1	189	77.33	7.695	76.24	78.43	59	95
90 Apr 4	FENCE	TR	COHO	1	53	76.57	8.436	74.25	78.88	57	94
90 Apr 11	FENCE	TR	COHO	1	315	88.50	9.362	87.46	89.53	65	112
90 Apr 18	FENCE	TR	COHO	1	919	86.15	9.808	85.52	86.79	62	115
90 Apr 25	FENCE	TR	COHO	1	801	85.21	9.392	84.56	85.86	61	115
90 May 2	FENCE	TR	COHO	1	71	88.73	7.731	86.91	90.56	70	109
90 May 9	FENCE	TR	COHO	1	11	90.27	7.989	84.90	95.64	77	107
90 May 16	FENCE	TR	COHO	1	8	90.50	5.928	85.55	95.45	81	99
90 May 23	FENCE	TR	COHO	1	245	86.26	6.282	85.47	87.04	73	108
90 May 30	FENCE	TR	COHO	1	50	85.96	4.314	84.73	87.19	77	97
90 Jun 6	FENCE	TR	COHO	1	20	87.50	10.430	82.63	92.37	73	112
90 Jun 13	FENCE	TR	COHO	1	28	87.75	6.120	85.38	90.12	74	102
90 Jun 20	FENCE	TR	COHO	1	16	86.25	3.679	84.29	88.21	80	93
90 Mar 7	FENCE	TR	COHO	2	1	101.00					
90 Mar 14	FENCE	TR	COHO	2	1	102.00					
90 Mar 21	FENCE	TR	COHO	2	1	100.00					
90 Mar 28	FENCE	TR	COHO	2	3	97.00	1.000	94.52	99.48	96	98
90 Apr 4	FENCE	TR	COHO	2	2	97.00	0.000	97.00	97.00	97	97
90 Apr 11	FENCE	TR	COHO	2	13	107.54	7.523	102.99	112.09	92	117
90 Apr 18	FENCE	TR	COHO	2	31	113.45	6.191	111.18	115.72	105	132
90 Apr 25	FENCE	TR	COHO	2	32	109.78	10.850	105.89	113.67	93	133
90 May 2	FENCE	TR	COHO	2	5	111.80	12.276	96.54	127.06	101	132

APPENDIX XIX. CONTINUED. Fish length data from 1990.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
90 Jun 19	II	SPS	COHO	0	171	59.84	5.466	59.02	60.66	46	75
90 Jun 19	II	SPS	COHO	1	3	79.67	3.786	70.27	89.07	77	84
90 Jun 23	III	SPS	COHO	0	83	55.75	5.712	54.50	56.99	46	71
90 Jun 23	III	SPS	COHO	1	3	85.67	4.933	73.42	97.91	80	89
90 Jun 22	IV	SPS	COHO	0	201	50.07	5.943	49.21	50.84	36	64
90 Jun 22	IV	SPS	COHO	1	8	80.25	7.678	73.32	87.54	72	92
90 Jun 22	V	SPS	COHO	0	91	48.36	5.255	47.27	49.46	36	66
90 Jun 22	V	SPS	COHO	1	6	76.67	4.274	72.18	81.15	72	84
90 Jun 21	VI	SPS	COHO	0	132	47.72	5.707	46.75	48.69	32	66
90 Jun 21	VI	SPS	COHO	1	3	81.00	7.000	63.62	98.38	74	88
90 Jun 20	VIII	SPS	COHO	0	77	45.53	4.327	44.55	46.51	38	62
90 Jun 19	II	SPS	RBT	1	1	117.00					
90 Jun 19	II	SPS	RBT	2	1	148.00					
90 Jun 22	IV	SPS	RBT	2	1	143.00					
90 Jun 21	VI	SPS	RBT	1	1	116.00					
90 Jun 19	II	SPS	CUT	2	2	143.50	4.950	99.01	187.99	140	147
90 Jun 23	III	SPS	CUT	1	1	129.00					
90 Jun 22	IV	SPS	CUT	1	1	92.00					
90 Jun 22	IV	SPS	CUT	3	1	224.00					
90 Jun 22	V	SPS	CUT	1	1	88.00					
90 Jun 20	VIII	SPS	CUT	2	1	142.00					
90 Jun 19	II	SPS	ALUT		25	77.44	22.517	68.16	86.72	44	132
90 Jun 23	III	SPS	ALUT		6	74.83	15.779	58.28	91.39	57	95
90 Jun 22	IV	SPS	ALUT		5	66.30	8.421	57.86	84.64	45	81
90 Jun 22	V	SPS	ALUT		5	72.80	19.110	49.04	96.56	46	99
90 Jun 21	VI	SPS	ALUT		5	75.60	24.283	27.89	105.11	49	112
90 Jun 21	VIII	SPS	ALUT		4	86.00	7.394	74.24	97.76	77	93
90 Jun 19	II	SPS	ASPR		6	81.83	26.248	54.29	109.37	64	130
90 Jun 24	Trib C	S	CUT	1	6	85.33	10.520	74.30	96.37	75	101
90 Jun 24	Trib C	S	CUT	3	1	162.00					
90 Jun 26	IX	S	CUT	0	7	27.00	0.000	27.00	27.00	27	27
90 Jun 26	IX	S	CUT	1	15	77.66	9.396	73.72	84.57	57	100
90 Jun 26	IX	S	CUT	2	5	145.80	15.172	126.94	164.66	128	160
90 Jun 26	X	S	CUT	0	1	26.00					
90 Jun 26	X	S	CUT	1	18	87.61	7.732	83.77	91.46	79	110
90 Jun 26	X	S	CUT	2	7	125.57	9.846	116.45	134.69	115	139

APPENDIX XX. Summaries from fork length data of juvenile fish caught in the tributary "TR", swamp "SW", and main channel "CC" study sections of Carnation Creek during the winter surveys (locations Fig.2). Tributaries were divided into upper "U" and lower "L" sections. The fish were caught in Baited minnow traps (M.TR).

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
87 Feb 18	TR750	M.TR	COHO	1	55	88.24	6.636	86.45	90.03	73	100
87 Feb 18	TR750	M.TR	COHO	2	2	118.00	9.899	29.03	206.97	111	125
87 Feb 22	SW150	M.TR	COHO	1	43	80.16	5.376	78.51	81.81	69	90
87 Feb 22	SW150	M.TR	COHO	2	1	105.00					
87 Feb 18	SW155	M.TR	COHO	1	149	79.62	9.075	78.16	81.07	58	101
87 Feb 18	SW155	M.TR	COHO	2	2	107.00	4.243	68.87	145.13	104	110
87 Feb 20	TR16L	M.TR	COHO	1	111	80.18	7.534	78.76	81.60	63	98
87 Feb 20	TR16L	M.TR	COHO	2	1	103.00					
87 Feb 20	TR16U	M.TR	COHO	1	40	85.63	6.931	83.41	87.84	72	99
87 Feb 20	TR16U	M.TR	COHO	2	1	114.00					
87 Feb 18	TR260	M.TR	COHO	1	24	94.25	6.306	91.59	96.91	84	102
87 Feb 18	TR260	M.TR	COHO	2	18	105.44	2.955	103.97	106.91	101	110
87 Feb 19	CC	M.TR	COHO	1	31	81.97	9.938	78.33	85.61	58	97
87 Feb 19	CC	M.TR	COHO	2	8	104.25	4.432	100.55	107.95	96	110
87 Feb 18	TR750	M.TR	CUT	2	1	126.00					
87 Feb 18	SW155	M.TR	CUT	1	1	86.00					
87 Feb 20	TR16L	M.TR	CUT	1	42	75.24	6.647	73.18	77.30	59	91
87 Feb 20	TR16L	M.TR	CUT	2	2	112.50	9.192	29.88	195.12	106	119
87 Feb 20	TR16U	M.TR	CUT	1	4	90.50	5.916	81.09	99.91	85	97
87 Feb 18	TR260	M.TR	CUT	1	26	81.35	9.278	77.60	85.09	66	98
87 Feb 18	TR260	M.TR	CUT	2	14	116.14	12.624	108.86	123.43	101	136
87 Feb 18	TR260	M.TR	CUT	3	4	149.75	10.813	132.56	166.94	140	161
87 Feb 19	CC	M.TR	CUT	2	1	114.00					
87 Feb 20	TR16L	M.TR	RBT	1	1	80.00					
87 Feb 18	TR260	M.TR	RBT	1	1	111.00					
87 Feb 18	TR260	M.TR	RBT	2	2	147.50	3.536	115.72	179.28	145	150
88 Feb 24	TR750	M.TR	COHO	1	153	75.61	8.393	74.28	76.94	49	95
88 Feb 23	SW125	M.TR	COHO	1	2	93.50	2.121	74.43	112.57	92	95
88 Feb 23	SW125	M.TR	COHO	2	1	113.00					
88 Feb 26	SW150	M.TR	COHO	1	109	69.28	11.667	67.06	71.49	53	105
88 Feb 26	SW155	M.TR	COHO	1	252	65.89	9.595	64.70	67.07	42	102
88 Feb 25	TR16L	M.TR	COHO	1	369	66.69	9.426	65.73	67.65	48	95
88 Feb 25	TR16U	M.TR	COHO	1	108	73.96	7.064	72.62	75.31	61	93
88 Feb 24	TR26L	M.TR	COHO	1	247	76.96	8.103	75.94	77.97	57	102
88 Feb 24	TR26L	M.TR	COHO	2	2	110.00	1.414	97.29	122.71	109	111
88 Feb 25	TR26U	M.TR	COHO	1	57	77.25	7.972	75.13	79.36	61	96
88 Feb 26	CC234	M.TR	COHO	1	84	77.38	9.912	75.23	79.53	55	100
88 Feb 26	CC234	M.TR	COHO	2	3	104.67	5.508	90.99	118.34	99	110
88 Feb 25	CC5&6	M.TR	COHO	1	94	71.77	9.204	69.89	73.65	54	97
88 Feb 25	CC5&6	M.TR	COHO	2	2	101.50	0.707	95.15	107.86	101	102
88 Feb 24	CC 8	M.TR	COHO	1	109	75.28	7.875	73.79	76.78	57	94

APPENDIX XX. CONTINUED. Fish length data from winter population estimates.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
88 Feb 26	SW155	M.TR	CUT	2	1	117.00					
88 Feb 25	TR16L	M.TR	CUT	1	24	72.42	11.271	67.65	77.18	52	92
88 FEB 25	TR16L	M.TR	CUT	2	1	113.00					
88 Feb 24	TR26L	M.TR	CUT	1	10	65.80	14.133	55.70	75.90	47	86
88 Feb 24	TR26L	M.TR	CUT	2	20	119.05	10.655	114.07	124.03	97	135
88 Feb 24	TR26L	M.TR	CUT	3	1	140.00					
88 Feb 25	TR26U	M.TR	CUT	1	14	60.79	6.104	57.26	64.31	53	73
88 Feb 25	TR26U	M.TR	CUT	2	8	105.00	6.024	99.97	110.03	95	113
88 Feb 25	TR26U	M.TR	CUT	3	2	157.00	8.485	80.74	233.26	151	163
88 Feb 26	CC234	M.TR	CUT	2	2	113.50	7.778	43.60	183.40	108	119
88 Feb 25	CC5&6	M.TR	CUT	2	2	110.00	9.899	21.03	198.97	103	117
88 Feb 24	CC 8	M.TR	CUT	2	5	117.00	13.675	100.00	134.00	96	130
88 Feb 26	CC234	M.TR	RBT	1	2	97.00	7.071	33.45	160.55	92	102
88 Feb 25	CC5&6	M.TR	RBT	1	23	80.13	10.712	75.51	84.75	63	101
88 Feb 25	CC5&6	M.TR	RBT	2	4	118.00	9.416	103.03	132.97	109	131
88 Feb 24	CC 8	M.TR	RBT	1	2	82.50	7.778	12.60	152.40	77	88
88 Feb 24	CC 8	M.TR	RBT	2	4	125.50	9.849	109.84	141.16	113	137
88 Feb 24	CC 8	M.TR	RBT	3	1	181.00					
89 Jan 27	TR75O	M.TR	COHO	1	136	85.27	6.293	84.21	86.33	70	98
89 Jan 27	TR75O	M.TR	COHO	2	11	102.36	1.912	101.08	103.65	100	107
89 Jan 28	SW125	M.TR	COHO	1	50	83.84	7.457	81.72	85.96	61	94
89 Jan 28	SW125	M.TR	COHO	2	10	101.30	4.001	98.44	104.16	97	108
89 Jan 27	SW15O	M.TR	COHO	1	249	77.47	8.098	76.46	78.48	59	98
89 Jan 27	SW15O	M.TR	COHO	2	6	103.00	5.138	97.61	108.39	98	111
89 Jan 28	SW155	M.TR	COHO	1	268	71.38	11.011	70.06	72.70	47	95
89 Jan 28	SW155	M.TR	COHO	2	6	98.83	4.708	93.89	103.77	95	108
89 Jan 29	TR16L	M.TR	COHO	1	264	69.19	10.844	67.88	70.50	51	96
89 Jan 29	TR16L	M.TR	COHO	2	9	100.78	5.495	96.55	105.01	96	113
89 Jan 29	TR16U	M.TR	COHO	1	72	79.21	8.253	77.27	81.14	64	95
89 Jan 29	TR16U	M.TR	COHO	2	4	100.00	4.761	92.43	107.57	97	107
89 Jan 28	TR26L	M.TR	COHO	1	212	79.50	7.684	78.47	80.53	63	96
89 Jan 28	TR26L	M.TR	COHO	2	11	99.36	2.203	97.88	100.85	96	102
89 Jan 29	TR26U	M.TR	COHO	1	29	80.83	6.503	78.35	83.30	66	94
89 Jan 29	TR26U	M.TR	COHO	2	1	99.00					
89 Jan 27	SW15O	M.TR	CUT	1	1	70.00					
89 Jan 28	SW155	M.TR	CUT	1	5	62.80	6.221	55.07	70.53	55	70
89 Jan 29	TR16L	M.TR	CUT	1	29	69.69	9.442	66.10	73.28	58	96
89 Jan 29	TR16L	M.TR	CUT	2	3	108.33	0.577	106.90	109.77	108	109
89 Jan 28	TR26L	M.TR	CUT	1	32	76.72	12.950	72.07	81.37	50	97
89 Jan 28	TR26L	M.TR	CUT	2	17	114.29	13.190	107.51	121.08	99	140
89 Jan 28	TR26L	M.TR	CUT	3	1	147.00					
89 Jan 29	TR26U	M.TR	CUT	1	9	79.33	11.225	70.69	87.98	65	98
89 Jan 29	TR26U	M.TR	CUT	2	5	115.00	15.379	95.88	134.12	102	135
89 Jan 27	SW15O	M.TR	RBT	1	2	67.00	2.828	41.58	92.42	65	69
89 Jan 29	TR16L	M.TR	RBT	1	26	70.73	7.460	67.72	73.74	59	84

APPENDIX XX. CONTINUED. Fish length data from winter population estimates.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
90 Jan 24	TR750	M.TR	COHO	1	223	75.91	7.181	74.96	76.85	58	99
90 Jan 24	SW125	M.TR	COHO	1	141	80.89	10.464	79.16	82.61	58	106
90 Jan 24	SW125	M.TR	COHO	2	7	116.14	6.388	110.23	122.06	110	127
90 Jan 30	SW150	M.TR	COHO	1	176	74.83	9.461	73.43	76.23	57	108
90 Jan 30	SW150	M.TR	COHO	2	1	112.00					
90 Jan 29	SW155	M.TR	COHO	1	440	70.53	10.871	69.52	71.55	48	104
90 Jan 29	SW155	M.TR	COHO	2	2	110.00	2.828	84.58	135.42	108	112
90 Jan 28	TR16L	M.TR	COHO	1	195	70.50	8.978	69.24	71.76	53	99
90 Jan 28	TR16U	M.TR	COHO	1	190	72.41	8.249	71.24	73.58	56	96
90 Jan 28	TR16U	M.TR	COHO	2	1	100.00					
90 Jan 30	TR26L	M.TR	COHO	1	47	89.91	6.656	87.96	91.87	76	104
90 Jan 30	TR26L	M.TR	COHO	2	1	111.00					
90 Jan 30	TR26U	M.TR	COHO	1	5	89.80	7.631	75.47	99.03	78	95
90 Feb 02	CC234	M.TR	COHO	1	28	74.71	9.156	71.17	78.26	54	95
90 Feb 01	CC5&6	M.TR	COHO	1	187	71.58	9.290	70.25	72.91	53	96
90 Feb 01	CC5&6	M.TR	COHO	2	2	102.00	1.414	89.29	114.71	101	103
90 Jan 31	CC 8	M.TR	COHO	1	23	81.04	8.850	77.22	84.86	65	95
90 Jan 31	CC 8	M.TR	COHO	2	4	102.25	2.217	98.72	105.78	100	105
90 Jan 28	TR16L	M.TR	CUT	1	6	86.50	11.845	74.07	98.93	66	96
90 Jan 28	TR16L	M.TR	CUT	2	3	112.33	4.619	100.87	123.80	107	115
90 Jan 30	TR26L	M.TR	CUT	1	25	83.04	10.147	78.86	87.22	53	99
90 Jan 30	TR26L	M.TR	CUT	2	59	117.31	10.939	114.46	120.15	100	143
90 Jan 30	TR26L	M.TR	CUT	3	1	162.00					
90 Jan 30	TR26U	M.TR	CUT	1	14	76.71	15.524	67.75	85.68	50	98
90 Jan 30	TR26U	M.TR	CUT	2	3	126.33	12.503	95.29	157.37	112	135
90 Feb 01	CC5&6	M.TR	CUT	2	3	114.67	7.638	95.71	133.63	108	123
90 Jan 31	CC 8	M.TR	CUT	1	3	86.67	11.590	57.89	115.44	76	99
90 Jan 31	CC 8	M.TR	CUT	2	12	115.83	12.655	107.80	123.87	101	140
90 Jan 28	TR16L	M.TR	RBT	1	3	98.33	9.609	74.48	122.19	88	107
90 Jan 28	TR16L	M.TR	RBT	2	1	118.00					
90 Feb 02	CC234	M.TR	RBT	2	3	124.00	14.177	88.80	159.20	108	135
90 Feb 01	CC5&6	M.TR	RBT	1	2	90.00	12.728	-24.39	204.39	81	99
90 Feb 01	CC5&6	M.TR	RBT	2	9	111.22	4.116	108.05	114.39	105	119
90 Jan 31	CC 8	M.TR	RBT	2	12	128.92	14.394	119.78	138.06	108	152

APPENDIX XXI. Summaries from fork length data of chum salmon fry caught in emergence traps in the Carnation Creek estuary. Data were partitioned by trap number (1-21), by trap combinations (3&4), or by a combination of "ALL" traps. During 1990, low water levels caused fry to emerge in an isolated "POOL".

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
88 Mar 09	1T06	TRAP	CHUM	0	21	41.48	0.928	41.05	41.90	40	43
88 Mar 14	1T05	TRAP	CHUM	0	12	40.83	1.946	39.60	42.07	35	43
88 Mar 14	1T06	TRAP	CHUM	0	21	41.95	0.384	41.78	42.13	41	43
88 Mar 16	1T06	TRAP	CHUM	0	16	41.88	0.719	41.49	42.26	40	43
88 Mar 18	1T05	TRAP	CHUM	0	19	41.47	1.611	40.70	42.25	39	45
88 Mar 18	1T06	TRAP	CHUM	0	16	41.69	1.138	41.08	42.29	40	43
88 Mar 21	1T05	TRAP	CHUM	0	8	41.38	1.061	40.49	42.26	39	42
88 Mar 21	1T07	TRAP	CHUM	0	24	40.33	0.963	39.93	40.74	39	44
88 Mar 24	1T01	TRAP	CHUM	0	8	41.00	0.926	40.23	41.77	40	42
88 Mar 24	1T06	TRAP	CHUM	0	9	40.78	0.833	40.14	41.42	40	42
88 Mar 24	1T07	TRAP	CHUM	0	11	40.18	0.603	39.78	40.59	39	41
89 Mar 02	1ALL	TRAP	CHUM	0	5	38.60	2.408	35.61	41.59	36	42
89 Mar 12	1ALL	TRAP	CHUM	0	8	40.50	0.756	39.87	41.13	40	42
89 Mar 17	1T10	TRAP	CHUM	0	18	41.11	1.183	40.52	41.70	39	44
89 Mar 22	T3&4	TRAP	CHUM	0	32	42.22	0.870	41.91	42.53	40	43
89 Mar 22	1T09	TRAP	CHUM	0	3	39.00	1.000	36.52	41.48	38	40
89 Mar 22	1T10	TRAP	CHUM	0	28	40.64	2.112	39.82	41.46	34	44
89 Mar 23	1T02	TRAP	CHUM	0	13	44.38	0.870	43.86	44.91	43	46
89 Mar 23	1T03	TRAP	CHUM	0	30	41.87	0.682	41.61	42.12	40	43
89 Mar 23	1T10	TRAP	CHUM	0	12	41.58	1.084	40.90	42.27	40	43
89 Mar 24	1T02	TRAP	CHUM	0	28	43.86	1.079	43.44	44.28	41	45
89 Mar 24	1T03	TRAP	CHUM	0	16	41.94	0.574	41.63	42.24	41	43
89 Mar 24	1T10	TRAP	CHUM	0	4	41.25	2.500	37.28	45.22	38	44
89 Mar 24	1T18	TRAP	CHUM	0	14	41.57	0.646	41.20	41.94	41	43
89 Mar 25	1T02	TRAP	CHUM	0	30	43.97	0.765	43.68	44.25	43	45
89 Mar 25	1T03	TRAP	CHUM	0	9	42.22	0.667	41.71	42.74	41	43
89 Mar 25	1T10	TRAP	CHUM	0	5	40.40	2.702	37.04	43.76	37	43
89 Mar 25	1T21	TRAP	CHUM	0	4	41.00	0.816	39.70	42.30	40	42
89 Mar 26	1T02	TRAP	CHUM	0	5	44.40	0.548	43.72	45.08	44	45
89 Mar 26	1T10	TRAP	CHUM	0	5	42.40	1.140	40.98	43.82	41	44
89 Mar 26	1T18	TRAP	CHUM	0	10	41.80	0.632	41.35	42.25	41	43
89 Mar 27	1T01	TRAP	CHUM	0	3	40.33	2.517	34.09	46.58	38	43
89 Mar 27	1T02	TRAP	CHUM	0	24	44.83	0.761	44.51	45.16	44	46
89 Mar 27	1T03	TRAP	CHUM	0	42	42.50	0.862	42.23	42.77	41	44
89 Mar 27	1T10	TRAP	CHUM	0	8	40.88	2.167	39.07	42.68	37	43
89 Mar 28	1T02	TRAP	CHUM	0	37	43.86	0.948	43.55	44.18	40	46
89 Mar 28	1T03	TRAP	CHUM	0	19	41.95	0.524	41.69	42.20	41	43
89 Mar 29	1T02	TRAP	CHUM	0	9	44.33	0.866	43.67	45.00	43	46
89 Mar 29	1T03	TRAP	CHUM	0	17	42.59	1.004	42.07	43.10	41	44
89 Mar 29	1T16	TRAP	CHUM	0	32	44.03	1.892	43.35	44.71	37	46
89 Mar 29	1T18	TRAP	CHUM	0	4	42.75	0.957	41.23	44.27	42	44
89 Mar 29	1T21	TRAP	CHUM	0	7	40.86	1.952	39.05	42.66	39	45
89 Mar 30	1T14	TRAP	CHUM	0	7	39.43	2.149	37.44	41.42	38	44

APPENDIX XXI CONTINUED. Length data of emerging chum fry.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN (mm)	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
89 Mar 31	1T09	TRAP	CHUM	0	9	42.22	0.441	41.88	42.56	42	43
89 Mar 31	1T10	TRAP	CHUM	0	12	42.25	1.603	41.23	43.27	40	45
89 Mar 31	1T16	TRAP	CHUM	0	20	43.80	0.951	43.36	44.24	42	45
89 Apr 01	1T02	TRAP	CHUM	0	9	44.44	0.527	44.04	44.85	44	45
89 Apr 01	1T03	TRAP	CHUM	0	7	42.14	1.464	40.79	43.50	41	45
89 Apr 01	1T14	TRAP	CHUM	0	10	39.60	0.699	39.10	40.10	39	41
89 Apr 01	1T16	TRAP	CHUM	0	17	45.71	1.105	45.14	46.27	44	47
89 Apr 01	1T17	TRAP	CHUM	0	9	43.33	0.500	42.95	43.72	43	44
89 Apr 02	1T02	TRAP	CHUM	0	20	43.85	0.587	43.58	44.12	43	45
89 Apr 04	1T03	TRAP	CHUM	0	13	42.15	0.555	41.82	42.49	41	43
89 Apr 04	1T09	TRAP	CHUM	0	18	42.11	0.963	41.63	42.59	40	44
89 Apr 04	1T13	TRAP	CHUM	0	17	41.12	1.577	40.31	41.93	39	44
89 Apr 04	1T17	TRAP	CHUM	0	19	41.84	1.864	40.94	42.74	40	46
89 Apr 05	1T02	TRAP	CHUM	0	42	43.74	1.083	43.40	44.07	41	45
89 Apr 05	1T16	TRAP	CHUM	0	11	44.64	1.804	43.42	45.85	40	46
89 Apr 05	1T17	TRAP	CHUM	0	11	42.64	0.674	42.18	43.09	42	44
89 Apr 05	1T21	TRAP	CHUM	0	14	40.93	1.328	40.16	41.70	40	45
89 Apr 06	1T02	TRAP	CHUM	0	9	41.78	0.667	41.26	42.29	41	43
89 Apr 06	1T03	TRAP	CHUM	0	10	42.10	0.876	41.47	42.73	41	44
89 Apr 06	1T10	TRAP	CHUM	0	4	41.25	2.986	36.50	46.00	38	45
89 Apr 06	1T14	TRAP	CHUM	0	6	40.33	1.633	38.62	42.05	38	42
89 Apr 07	1T02	TRAP	CHUM	0	33	41.42	1.091	41.04	41.81	40	45
89 Apr 07	1T17	TRAP	CHUM	0	11	42.73	0.786	42.20	43.26	42	44
89 Apr 10	1T08	TRAP	CHUM	0	9	39.89	0.782	39.29	40.49	39	41
89 Apr 11	1T02	TRAP	CHUM	0	21	42.33	1.155	41.81	42.86	40	44
89 Apr 11	1T14	TRAP	CHUM	0	12	38.75	1.422	37.85	39.65	35	40
89 Apr 15	1T02	TRAP	CHUM	0	14	41.93	1.207	41.23	42.63	40	44
89 Apr 15	1T10	TRAP	CHUM	0	24	40.42	0.504	40.20	40.63	40	41
89 Apr 17	1T08	TRAP	CHUM	0	26	41.50	0.648	41.24	41.76	40	43
89 Apr 22	1T07	TRAP	CHUM	0	18	41.56	1.042	41.04	42.07	38	42
89 Apr 22	1T13	TRAP	CHUM	0	5	40.80	0.447	40.24	41.36	40	41
89 Apr 23	1T02	TRAP	CHUM	0	34	41.03	0.460	40.87	41.19	40	42
89 Apr 24	1T02	TRAP	CHUM	0	34	41.06	0.422	40.91	41.21	40	42
89 Apr 25	1T02	TRAP	CHUM	0	11	41.00	0.447	40.70	41.30	40	42
89 Apr 26	1T02	TRAP	CHUM	0	19	40.95	0.705	40.61	41.29	40	42
89 Apr 28	1T02	TRAP	CHUM	0	26	40.65	0.689	40.38	40.93	39	42
89 May 13	1T16	TRAP	CHUM	0	6	38.67	1.366	37.23	40.10	37	41
90 Mar 05	1ALL	TRAP	CHUM	0	23	42.00	1.087	41.53	42.47	40	44
90 Mar 09	1ALL	TRAP	CHUM	0	10	41.60	0.843	41.00	42.20	40	43
90 Mar 29	1ALL	POOL	CHUM	0	138	41.69	1.066	41.51	41.87	39	44
90 Apr 10	1ALL	TRAP	CHUM	0	18	42.44	0.784	42.05	42.83	41	44
90 Apr 20	1ALL	POOL	CHUM	0	40	42.17	0.675	41.96	42.39	41	44

APPENDIX XXII. Length-weight relationships (Wt.= a* Length**b) and condition factors (K) of juvenile fish caught in Carnation Creek during 1987. Condition factor formula is K = Wt.*10**5 / Length**3. Periodically, data was combined for "ALL" sections and ages.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1987								
March 26	Carnation	Fence	Chum	0	54	0.629	57.700	1.795
March 29	Carnation	Fence	Chum	0	50	0.618	6437.000	0.540
April 8	Carnation	Fence	Chum	0	50	0.597	41.680	1.863
April 18	Carnation	Fence	Chum	0	33	0.617	907.500	1.050
April 19	Carnation	Fence	Chum	0	17	0.609	301.400	1.343
April 21	Carnation	Fence	Chum	0	50	0.589	314.000	1.317
March 26	Carnation	Fence	Coho	1	25	1.050	0.215	3.362
April 8	Carnation	Fence	Coho	1	17	1.054	4.911	2.659
				2	3	1.057	77140.000	0.614
April 21	Carnation	Fence	Coho	1	19	0.976	1.217	2.950
				2	1	0.992		
April 28	Carnation	Fence	Coho	1	31	0.978	0.737	3.062
				2	2	0.918	7.710	2.559
May 5	Carnation	Fence	Coho	1	19	0.981	0.524	3.139
				2	1	0.949		
May 9	Carnation	Fence	Coho	1	21	0.986	0.761	3.057
May 20	Carnation	Fence	Coho	1	18	0.953	4.194	2.671
				2	1	0.892		
Apr8-May20	Carnation	Fence	Coho	ALL 2	8	0.980	47.980	2.179
May 26	Carnation	II	Coho	0	24	1.040	0.840	3.057
May 27	Carnation	VI	Coho	0	15	1.040	0.672	3.111
				1	1	1.234		
May 27	Carnation	VIII	Coho	0	17	0.972	0.518	3.163
Sep. 15	Carnation	II	Coho	0	22	1.034	0.678	3.102
				1	6	1.147	89.710	2.007
Sep. 16	Carnation	III	Coho	0	21	1.078	1.342	2.948
				1	5	1.150	1.973	2.878
Sep. 16	Carnation	IV	Coho	0	23	1.024	0.428	3.215
				1	4	1.041	3.376	2.731
Sep. 15	Carnation	VI	Coho	0	11	1.060	1.046	3.002
				1	4	1.114	2.098	2.856
Sep. 14	Carnation	VIII	Coho	0	16	1.030	1.181	2.968
				1	4	1.076	0.018	3.933
May 28	Carnation	V	Rainbow	1	1	0.977		
May 26	Carnation	II	Cutthroat	1	2	1.004	20.640	2.330
May 27	Carnation	III	Cutthroat	1	2	0.987	37.050	2.204
				2	2	1.019	0.035	3.708
May 28	Carnation	V	Cutthroat	1	2	0.999	0.009	4.048
May 27	Carnation	VI	Cutthroat	1	3	1.027	11.370	2.461
				2	2	0.929	3.470	2.723
May 27	Carnation	VIII	Cutthroat	1	1	1.066		
				2	2	1.097	0.000	7.228

APPENDIX XXII CONTINUED Length-weight data 1987.

Date		Location	Section	Species	age	n	K	a (x10-5)	b
1987									
May	27	Carnation	ALL	Cutthroat	1	10	1.013	4.858	2.653
May	27	Carnation	ALL	Cutthroat	2	6	1.015	0.009	3.970
June	4	Carnation	IX	Cutthroat	1	16	1.044	1.649	2.894
					2	8	0.957	1.101	2.971
June	11	Carnation	X	Cutthroat	1	23	1.002	3.359	2.726
					2	21	1.020	4.641	2.687
					3	1	1.118		
June	4	Carnation	Trib C	Cutthroat	1	10	1.207	12.770	2.474
					2	1	1.192		
Sep.	15	Carnation	II	Cutthroat	1	4	1.004	3.809	2.712
Sep.	16	Carnation	III	Cutthroat	0	1	0.977		
					1	2	0.982	38270.000	0.744
Sep.	16	Carnation	IV	Cutthroat	0	3	0.948	2.061	2.818
					1	2	0.982	0.007	4.065
					2	2	0.884	11540.000	1.071
Sep.	15	Carnation	VI	Cutthroat	0	14	0.940	5.148	2.591
					1	3	0.936	2.672	2.770
					2	2	0.840	0.025	3.718
Sep.	14	Carnation	VIII	Cutthroat	0	1	1.013		
					1	1	1.082		
					2	1	0.951		
Sep.	17	Carnation	X	Cutthroat	0	17	0.945	0.369	3.246
					1	17	0.989	5.394	2.625
					2	8	0.943	4.364	2.685
Sep.	14	Carnation	Trib C	Cutthroat	0	12	0.971	0.443	3.199
					1	7	0.996	3.540	2.732
					2	1	0.929		
					3	1	1.101		
May	26	Carnation	II	Aleuticus	ALL	22	1.085	0.829	3.060
May	27	Carnation	III	Aleuticus	ALL	9	1.081	2.506	2.804
May	28	Carnation	V	Aleuticus	ALL	17	1.069	0.329	3.262
May	27	Carnation	VI	Aleuticus	ALL	10	1.054	0.268	3.300
May	27	Carnation	VIII	Aleuticus	ALL	3	1.157	295.500	1.799
Sep.	15	Carnation	II	Aleuticus	ALL	19	1.092	0.847	3.060
Sep.	16	Carnation	III	Aleuticus	ALL	4	1.175	0.003	4.425
Sep.	16	Carnation	IV	Aleuticus	ALL	8	1.077	0.319	3.267
Sep.	15	Carnation	VI	Aleuticus	ALL	4	1.138	1.094	3.011
May	26	Carnation	II	Asper	ALL	6	1.103	0.646	3.120
May	27	Carnation	III	Asper	ALL	4	1.127	0.086	3.550

APPENDIX XXIII. Length-weight relationships (Wt.= a* Length**b) and condition factors (K) of juvenile fish caught in Carnation Creek during 1988. Condition factor formula is K = Wt.*10**5 / Length**3.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1988								
March 26	Carnation	Fence	Chum	0	50	0.613	2.515	2.622
March 30	Carnation	Fence	Chum	0	50	0.597	1.292	2.794
April 8	Carnation	Fence	Chum	0	50	0.594	7.513	2.325
April 8	Carnation	Fence	Coho	1	25	0.994	0.861	3.032
				2	3	1.048	0.083	3.548
April 12	Carnation	Fence	Coho	1	27	0.961	0.451	3.173
				2	1	0.914		
April 14	Carnation	Fence	Coho	1	45	0.948	1.000	2.988
				2	3	0.997	69.050	2.079
April 19	Carnation	Fence	Coho	1	29	0.944	0.744	3.054
				2	1	0.977		
April 29	Carnation	Fence	Coho	1	58	0.978	1.023	2.990
May 3	Carnation	Fence	Coho	1	20	0.957	0.445	3.172
				2	1	0.999		
May 13	Carnation	Fence	Coho	1	47	0.976	0.551	3.127
				2	1	0.942		
May 18	Carnation	Fence	Coho	1	29	0.965	0.525	3.136
June 8	Carnation	II	Coho	0	32	1.169	0.365	3.289
June 9	Carnation	III	Coho	0	37	1.116	0.540	3.185
				1	1	1.194		
June 8	Carnation	IV	Coho	0	53	1.076	1.467	2.914
				1	4	1.076	0.035	3.797
June 7	Carnation	V	Coho	0	4	1.169	0.896	3.068
				1	3	1.175	0.000	6.093
June 7	Carnation	VI	Coho	0	15	1.133	0.898	3.058
				1	2	1.136	1178.000	1.411
June 9	Carnation	VIII	Coho	0	39	0.941	1.607	2.866
				1	2	1.454	0.029	3.890
Sep. 13	Carnation	II	Coho	0	31	1.113	1.039	3.016
				1	3	1.228	1.956	2.897
Sep. 13	Carnation	III	Coho	0	37	1.137	0.792	3.084
				1	1	1.254		
Sep. 14	Carnation	IV	Coho	0	35	1.083	0.607	3.139
				1	8	1.174	0.028	3.838
Sep. 14	Carnation	V	Coho	0	27	1.116	0.445	3.220
				1	7	1.232	21.850	2.348
Sep. 14	Carnation	VI	Coho	0	30	1.134	0.358	3.269
				1	1	1.137		
Sep. 12	Carnation	VIII	Coho	0	17	1.098	0.914	3.043
Sep. 12	Carnation	VIII+	Coho	0	18	1.126	1.912	2.873
				1	2	1.146	0.1607E+10	-1.710

APPENDIX XXIII. CONTINUED. Length-weight data 1988.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1988								
June 8	Carnation	II	Rainbow	1	1	1.067		
June 9	Carnation	III	Rainbow	2	2	1.152	0.119	3.470
June 8	Carnation	IV	Rainbow	1	1	1.156		
June 7	Carnation	VI	Rainbow	1	1	0.940		
June 9	Carnation	VIII	Trout	0	2	0.797		
Sep. 13	Carnation	II	Rainbow	1	2	0.934	4.760	2.659
Sep. 14	Carnation	IV	Rainbow	0	6	0.969	2.055	2.820
				1	1	0.888		
Sep. 14	Carnation	V	Rainbow	0	23	0.974	0.839	3.037
				1	1	1.170		
Sep. 14	Carnation	VI	Rainbow	0	17	1.047	13.730	2.387
				1	3	1.069	152.500	1.951
Sep. 12	Carnation	VIII	Rainbow	0	10	0.973	0.895	3.012
				1	2	0.895	4493.000	1.145
June 8	Carnation	II	Cutthroat	1	1	1.182		
June 16	Carnation	IX	Cutthroat	1	31	1.022	0.990	3.006
				2	4	1.018	0.321	3.239
June 16	Carnation	X	Cutthroat	1	36	1.052	1.486	2.921
				2	7	1.114	1.967	2.881
June 9	Carnation	Trib C	Cutthroat	1	11	1.098	0.557	3.149
				2	2	1.130	28.950	2.340
Sep. 13	Carnation	III	Cutthroat	3	1	0.956		
Sep. 14	Carnation	V	Cutthroat	1	1	0.910		
				2	1	0.927		
Sep. 12	Carnation	VIII	Cutthroat	1	1	0.888		
				2	1	0.899		
Sep. 15	Carnation	IX	Cutthroat	0	10	1.039	0.864	3.047
				1	29	0.990	1.325	2.937
Sep. 15	Carnation	X	Cutthroat	0	51	1.052	1.857	2.856
				1	23	1.002	1.308	2.942
Sep. 16	Carnation	Trib C	Cutthroat	0	17	1.053	0.555	3.164
				1	12	0.946	0.563	3.111
				2	1	1.272		
June 8	Carnation	II	Aleuticus		23	1.131	0.269	3.335
June 9	Carnation	III	Aleuticus		7	1.217	1.842	2.903
June 8	Carnation	IV	Aleuticus		5	1.196	7.434	2.608
June 7	Carnation	VI	Aleuticus		6	1.096	6.632	2.596
June 9	Carnation	VIII	Aleuticus		3	1.143	6233.000	1.179
Sep. 13	Carnation	II	Aleuticus		17	1.069	0.602	3.150
Sep. 13	Carnation	III	Aleuticus		10	1.108	0.817	3.072
Sep. 14	Carnation	IV	Aleuticus		3	1.117	0.189	3.400
Sep. 14	Carnation	V	Aleuticus		6	1.098	0.045	3.710
Sep. 14	Carnation	VI	Aleuticus		2	1.202	0.111	3.526
June 8	Carnation	II	Asper		3	1.158	0.966	3.045
Sep. 13	Carnation	II	Asper		4	1.171	0.189	3.382

APPENDIX XXIV. Length-weight relationships (Wt.= a* Length**b) and condition factors (K) of juvenile fish caught in Carnation Creek during 1989. Condition factor formula is K = Wt.*10**5 / Length**3.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1989								
March 7	Carnation	Fence	Chum	0	8	0.729	1730.000	0.862
March 8	Carnation	Fence	Chum	0	3	0.703	0.000	7.924
March 13	Carnation	Fence	Chum	0	7	0.672	1387.000	0.920
March 18	Carnation	Fence	Chum	0	3	0.549	5330.000	0.532
March 19	Carnation	Fence	Chum	0	52	0.608	1.459	2.763
March 20	Carnation	Fence	Chum	0	34	0.641	0.292	3.212
March 26	Carnation	Fence	Chum	0	50	0.646	96.650	1.652
April 2	Carnation	Fence	Chum	0	50	0.609	30.430	1.945
April 9	Carnation	Fence	Chum	0	50	0.630	2.929	2.587
April 16	Carnation	Fence	Chum	0	60	0.602	4.770	2.439
April 21	Carnation	Fence	Chum	0	50	0.682	0.285	3.234
April 28	Carnation	Fence	Chum	0	20	0.582	0.053	3.643
April 30	Carnation	Fence	Chum	0	12	0.605	0.036	3.751
May 1	Carnation	Fence	Chum	0	8	0.523	0.187	3.277
April 18	Carnation	Fence	Coho	1	15	0.978	0.629	3.097
				2	3	1.021	312.800	1.773
May 3	Carnation	Fence	Coho	1	20	0.970	3.177	2.736
				2	1	0.929		
May 17	Carnation	Fence	Coho	1	23	0.990	0.364	3.224
				2	1	0.981		
May 29	Carnation	II	Coho	0	37	1.068	0.743	3.091
				1	1	1.101		
May 30	Carnation	III	Coho	0	55	1.062	0.659	3.123
May 30	Carnation	IV	Coho	0	55	1.038	0.422	3.234
				1	9	1.163	16.720	2.386
May 29	Carnation	V	Coho	0	38	1.022	0.131	3.526
				1	1	1.529		
May 29	Carnation	VI	Coho	0	36	0.989	0.882	3.030
				1	2	1.087	3.252	2.749
May 31	Carnation	VIII	Coho	0	27	1.074	0.068	3.707
Sep. 10	Carnation	II	Coho	0	27	1.089	1.177	2.982
				1	4	1.156	0.875	3.061
Sep. 10	Carnation	III	Coho	0	29	1.092	1.071	3.005
Sep. 12	Carnation	IV	Coho	0	27	1.086	0.607	3.142
				1	4	1.142	136.300	1.922
Sep. 12	Carnation	V	Coho	0	26	1.080	0.753	3.087
Sep. 11	Carnation	VI	Coho	0	27	1.094	0.983	3.025
				1	2	1.167	0.002	4.364
Sep. 11	Carnation	VIII	Coho	0	10	1.125	0.152	3.453

APPENDIX XXIV. CONTINUED. Length-weight data 1989.

Date		Location	Section	Species	age	n	K	a (x10-5)	b
1989									
May	29	Carnation	II	Rainbow	1	8	1.092	28.730	2.267
May	30	Carnation	III	Rainbow	1	2	1.034	6.862	2.584
May	30	Carnation	IV	Rainbow	1	2	1.290	6.344	2.646
May	29	Carnation	V	Rainbow	1	10	1.081	0.039	3.759
May	29	Carnation	V	Rainbow	2	1	0.974		
					3	1	1.116		
May	29	Carnation	VI	Rainbow	1	15	1.009	0.055	3.657
May	31	Carnation	VIII	Rainbow	1	1	1.124		
					2	1	1.022		
Sep.	10	Carnation	II	Rainbow	1	2	1.117	0.000	6.770
Sep.	10	Carnation	III	Rainbow	1	1	1.188		
Sep.	12	Carnation	IV	Rainbow	1	5	1.054	0.400	3.207
Sep.	12	Carnation	V	Rainbow	1	7	0.970	8.154	2.533
					2	1	1.007		
Sep.	11	Carnation	VI	Rainbow	1	14	1.034	3.236	2.752
Sep.	11	Carnation	VIII	Rainbow	1	5	0.982	1.411	2.918
May	29	Carnation	II	Cutthroat	1	1	0.897		
May	30	Carnation	III	Cutthroat	1	1	1.043		
					2	1	0.982		
May	30	Carnation	IV	Cutthroat	1	1	0.957		
					2	1	0.995		
May	29	Carnation	V	Cutthroat	2	2	1.033	0.000	4.701
May	31	Carnation	VIII	Cutthroat	1	5	1.060	22.620	2.299
					2	2	1.035	0.994	3.009
May	31	Carnation	IX	Cutthroat	1	18	1.024	0.202	3.367
					2	9	0.944	1.954	2.850
June	1	Carnation	X	Cutthroat	1	17	1.019	2.123	2.835
					2	7	0.988	0.572	3.114
May	28	Carnation	Trib C	Cutthroat	1	8	1.008	5.293	2.631
					2	2	0.991	3.362	2.752
					3	1	0.965		
Sep.	10	Carnation	II	Cutthroat	1	1	0.969		
					2	1	0.890		
Sep.	12	Carnation	V	Cutthroat	1	4	1.007	166.900	1.863
Sep.	11	Carnation	VIII	Cutthroat	1	4	1.020	1.084	2.987
					2	1	0.940		
Sep.	13	Carnation	IX	Cutthroat	0	28	0.943	0.339	3.265
					1	21	1.016	2.788	2.783
					2	3	0.928	1.262	2.938
Sep.	13	Carnation	X	Cutthroat	0	20	0.961	0.573	3.128
					1	19	0.971	1.697	2.882
					2	6	0.980	2.049	2.852
Sep.	13	Carnation	Trib C	Cutthroat	0	19	1.001	0.341	3.263
					1	5	1.001	2.816	2.776
					2	1	1.017		
					3	1	1.212		

APPENDIX XXIV. CONTINUED. Length-weight data 1989.

Date		Location	Section	Species	age	n	K	a (x10-5)	b
1989									
May	29	Carnation	II	Aleuticus		17	1.122	1.079	3.011
May	30	Carnation	III	Aleuticus		12	1.091	0.469	3.194
May	30	Carnation	IV	Aleuticus		6	1.141	0.470	3.194
May	29	Carnation	V	Aleuticus		7	1.085	0.153	3.427
May	29	Carnation	VI	Aleuticus		3	1.041	0.000	6.978
Sep.	10	Carnation	II	Aleuticus		26	1.043	0.200	3.389
Sep.	10	Carnation	III	Aleuticus		13	1.093	0.345	3.261
Sep.	12	Carnation	IV	Aleuticus		7	1.137	0.480	3.196
Sep.	12	Carnation	V	Aleuticus		7	1.076	0.065	3.625
Sep.	11	Carnation	VI	Aleuticus		3	1.103	0.532	3.156
Sep.	11	Carnation	VIII	Aleuticus		2	1.297	0.1343E+19	-5.670
May	29	Carnation	II	Asper		1	1.118		
May	30	Carnation	III	Asper		2	1.167	7.129	2.605
Sep.	10	Carnation	II	Asper		4	1.115	0.003	4.286
Sep.	10	Carnation	III	Asper		2	1.150	0.664	3.118

APPENDIX XXV. Length-weight relationships (Wt.= a* Length**b) and condition factors (K) of juvenile fish caught in Carnation Creek during 1990. Condition factor formula is K = Wt.*10**5 / Length**3.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1990								
March 24	Carnation	Fence	Chum	0	4	0.550	40000.000	0.000
April 12	Carnation	Fence	Chum	0	16	0.623	21.360	2.058
March 23	Carnation	Fence	Coho	0	50	0.690	1.213	2.843
March 24	Carnation	Fence	Coho	0	50	0.697	6.761	2.369
March 28	Carnation	Fence	Coho	0	43	0.743	0.003	4.520
March 29	Carnation	Fence	Coho	0	44	0.762	0.171	3.412
April 1	Carnation	Fence	Coho	0	50	0.762	0.978	2.931
April 7	Carnation	Fence	Coho	1	6	1.045	0.635	3.106
April 10	Carnation	Fence	Coho	1	15	0.972	7.750	2.540
April 11	Carnation	Fence	Coho	1	32	0.957	1.981	2.837
				2	1	0.882		
April 14	Carnation	Fence	Coho	1	48	0.926	1.396	2.909
				2	2	0.886	0.007	4.013
April 20	Carnation	Fence	Coho	1	32	0.967	1.370	2.922
				2	1	0.942		
April 25	Carnation	Fence	Coho	1	48	0.950	0.567	3.112
				2	6	1.013	8.296	2.557
May 1	Carnation	Fence	Coho	1	4	0.953	0.843	3.028
May 2	Carnation	Fence	Coho	1	10	0.966	1.677	2.878
				2	2	0.930	0.563	3.106
May 3	Carnation	Fence	Coho	1	11	0.955	2.495	2.787
May 4	Carnation	Fence	Coho	1	9	0.987	4.702	2.654
May 6	Carnation	Fence	Coho	1	4	0.957	2.831	2.760
May 7	Carnation	Fence	Coho	1	1	0.920		
May 8	Carnation	Fence	Coho	1	5	0.954	0.588	3.109
May 9	Carnation	Fence	Coho	1	1	0.665		
May 16	Carnation	Fence	Coho	1	2	0.912	0.000	9.103
May 17	Carnation	Fence	Coho	1	1	1.044		
May 20	Carnation	Fence	Coho	1	20	0.956	1.402	2.914
May 25	Carnation	Fence	Coho	1	2	1.103	202.600	1.841
May 27	Carnation	Fence	Coho	1	26	0.948	1.328	2.924
May 28	Carnation	Fence	Coho	1	13	0.950	0.180	3.373
May 29	Carnation	Fence	Coho	1	4	0.931	0.003	4.291
May 30	Carnation	Fence	Coho	1	6	0.959	37.560	2.174
June 6	Carnation	Fence	Coho	1	2	0.818	906.300	1.422
June 7	Carnation	Fence	Coho	1	2	0.998	5.225	2.635
June 8	Carnation	Fence	Coho	1	16	0.941	5.293	2.612
June 19	Carnation	II	Coho	0	4	1.108	10.650	2.442
June 23	Carnation	III	Coho	0	25	1.107	2.274	2.822
				1	3	1.096	0.000	6.039
June 22	Carnation	IV	Coho	0	23	1.126	0.920	3.051
June 22	Carnation	V	Coho	0	27	1.204	1.835	2.896
				1	6	1.143	0.623	3.140

APPENDIX XXV. CONTINUED. Length-weight data 1990.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1990								
June 21	Carnation	VI	Coho	0	21	1.126	0.343	3.305
				1	3	1.281	2301.000	1.292
June 20	Carnation	VIII	Coho	0	37	1.061	0.303	3.328
June 22	Carnation	IV	Rainbow	2	1	1.043		
June 21	Carnation	VI	Rainbow	1	1	1.092		
June 23	Carnation	III	Cutthroat	1	1	1.143		
June 22	Carnation	V	Cutthroat	1	1	1.123		
June 20	Carnation	VIII	Cutthroat	2	1	0.974		
June 26	Carnation	IX	Cutthroat	0	4	0.889		
				1	15	1.080	4.012	2.697
				2	5	1.026	4.245	2.714
June 26	Carnation	X	Cutthroat	0	1	0.569		
				1	16	1.090	18.220	2.369
				2	7	1.037	2.237	2.841
June 24	Carnation	Trib C	Cutthroat	1	5	1.179	8.144	2.568
				3	1	1.235		
June 23	Carnation	III	Aleuticus		6	1.233	2.962	2.792
June 22	Carnation	V	Aleuticus		5	1.116	1.291	2.968
June 21	Carnation	VI	Aleuticus		3	1.097	1.767	2.896
June 20	Carnation	VIII	Aleuticus		3	1.299	143.300	1.936

APPENDIX XXVI. Length-weight relationships (Wt.= a* Length**b) and condition factors (K) of juvenile fish caught in the Tributary "TR", Swamp "SW", and Main channel "CC" study sections of Carnation Creek during the winter population estimates. Tributaries were divided into upper "U" and lower "L" sections (Fig.2).

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1988								
Feb. 24	Carnation	TR750	Coho	1	90	1.000	1.280	2.940
Feb. 26	Carnation	SW150	Coho	1	34	1.027	1.498	2.915
Feb. 26	Carnation	SW155	Coho	1	36	1.007	0.914	3.024
Feb. 25	Carnation	TR16L	Coho	1	26	1.017	0.774	3.064
Feb. 25	Carnation	TR16U	Coho	1	32	1.013	1.087	2.982
Feb. 24	Carnation	TR26L	Coho	1	41	1.010	0.948	3.016
				2	1	0.930		
Feb. 25	Carnation	TR26U	Coho	1	32	0.971	0.571	3.122
Feb. 26	Carnation	CC234	Coho	1	46	1.021	1.081	2.987
				2	3	1.087	69.740	2.105
Feb. 25	Carnation	CC5&6	Coho	1	29	0.956	0.639	3.092
				2	2	1.025	0.000	7.101
Feb. 24	Carnation	CC8	Coho	1	29	0.978	0.569	3.125
Feb. 26	Carnation	SW155	Cutthroat	2	1	0.949		
Feb. 25	Carnation	TR16L	Cutthroat	1	15	0.904	0.754	3.045
				2	1	0.904		
Feb. 24	Carnation	TR26L	Cutthroat	1	8	0.870	2.186	2.784
				2	8	0.879	0.108	3.439
Feb. 25	Carnation	TR26U	Cutthroat	1	14	0.929	1.330	2.912
				2	8	0.891	0.177	3.346
				3	2	0.971	192.100	1.954
Feb. 26	Carnation	CC234	Cutthroat	2	2	0.968	0.094	3.494
Feb. 25	Carnation	CC5&6	Cutthroat	2	2	0.999	1584.000	1.431
Feb. 24	Carnation	CC8	Cutthroat	2	5	0.914	0.147	3.380
Feb. 26	Carnation	CC234	Rainbow	1	2	0.898	307.300	1.723
Feb. 25	Carnation	CC5&6	Rainbow	1	20	0.867	0.669	3.058
				2	3	1.008	0.000	5.369
Feb. 24	Carnation	CC8	Rainbow	1	2	0.825	0.607	3.070
				2	3	0.899	3.948	2.695
				3	1	0.573		
1989								
Jan. 27	Carnation	TR750	Coho	1	15	1.083	1.993	2.863
				2	1	1.080		
Jan. 27	Carnation	SW150	Coho	1	21	1.059	2.764	2.780
				2	2	0.973	33620.000	0.760

APPENDIX XXVI. CONTINUED. Fish length-weight data from off-channel habitat during the winter.

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1990								
Jan. 24	Carnation	TR750	Coho	1	39	0.994	1.640	2.886
Jan. 24	Carnation	SW125	Coho	1	33	1.017	1.721	2.880
				2	1	0.893		
Jan. 30	Carnation	SW150	Coho	1	38	1.049	1.914	2.862
				2	1	0.964		
Jan. 29	Carnation	SW155	Coho	1	39	1.018	0.878	3.032
Jan. 28	Carnation	TR16L	Coho	1	37	1.028	1.350	2.939
Jan. 28	Carnation	TR16U	Coho	1	27	1.008	0.177	3.405
Jan. 30	Carnation	TR26L	Coho	1	19	1.046	0.894	3.036
Jan. 30	Carnation	TR26L	Coho	2	1	0.951		
Jan. 30	Carnation	TR26U	Coho	1	4	1.026	1.746	2.882
Feb. 2	Carnation	CC234	Coho	1	23	0.999	1.026	2.994
Feb. 1	Carnation	CC5&6	Coho	1	39	0.993	0.789	3.054
				2	1	1.024		
Jan. 31	Carnation	CC8	Coho	1	20	0.999	1.826	2.862
				2	3	1.003	0.018	3.877
Jan. 28	Carnation	TR16L	Cutthroat	1	3	0.925	0.297	3.253
				2	2	0.962		
Jan. 30	Carnation	TR26L	Cutthroat	1	5	0.933	1.225	2.940
				2	21	0.933	0.972	2.991
				3	1	0.961		
Jan. 30	Carnation	TR26U	Cutthroat	1	14	1.000	0.958	3.010
				2	3	1.019	51.120	2.190
Feb. 1	Carnation	CC5&6	Cutthroat	2	3	1.016	0.000	4.818
Jan. 31	Carnation	CC8	Cutthroat	1	1	0.876		
				2	5	0.939	0.299	3.241
Jan. 30	Carnation	TR26L	Rainbow	1	2	1.004	0.036	3.714
				2	1	1.019		
Feb. 2	Carnation	CC234	Rainbow	2	3	1.005	0.113	3.454
Feb. 1	Carnation	CC5&6	Rainbow	1	2	0.906	0.191	3.346
				2	9	1.043	0.194	3.357
Jan. 31	Carnation	CC8	Rainbow	2	4	0.908	0.470	3.137

APPENDIX XXVII. Length-weight relationships (Wt.= a* Length**b) and condition factors (K) of chum salmon fry caught in the emergence traps. Values are shown for each trap (1-21) or for "ALL" traps. The formula Wt.*10**5 / Length**3 produced condition factor.

Date	Location	Trap#	Species	age	n	K	a (x10-5)	b
1988								
March 9	Carnation	TR06	Chum	0	21	0.582	2470000.000	-1.100
March 14	Carnation	TR05	Chum	0	12	0.598	5053.000	0.559
March 14	Carnation	TR06	Chum	0	21	0.546	1949.000	0.811
March 16	Carnation	TR06	Chum	0	16	0.561	35120.000	0.042
March 18	Carnation	TR05	Chum	0	19	0.603	988.000	1.012
March 18	Carnation	TR06	Chum	0	16	0.578	3648.000	0.654
March 21	Carnation	TR05	Chum	0	8	0.624	7.572	2.330
March 21	Carnation	TR07	Chum	0	24	0.599	61.710	1.746
March 24	Carnation	TR01	Chum	0	8	0.611	12480.000	0.327
March 24	Carnation	TR06	Chum	0	9	0.612	0.467	3.073
March 24	Carnation	TR07	Chum	0	11	0.614	3505.000	0.658
1989								
March 2	Carnation	ALL	Chum	0	5	0.756	2244.000	0.808
March 12	Carnation	ALL	Chum	0	8	0.628	13.240	2.177
March 17	Carnation	TR10	Chum	0	18	0.603	86.360	1.664
March 22	Carnation	TR03	Chum	0	30	0.610	180.100	1.481
March 22	Carnation	TR04	Chum	0	2	0.624		
March 22	Carnation	TR09	Chum	0	3	0.595	0.208	3.287
March 22	Carnation	TR10	Chum	0	28	0.630	97.050	1.639
March 23	Carnation	TR02	Chum	0	3	0.623	1301000.000	-0.861
March 23	Carnation	TR03	Chum	0	30	0.620	10220.000	0.400
March 23	Carnation	TR10	Chum	0	12	0.590	1.601	2.732
March 24	Carnation	TR02	Chum	0	24	0.630	5.674	2.418
March 24	Carnation	TR03	Chum	0	16	0.605	381.700	1.274
March 24	Carnation	TR10	Chum	0	4	0.599	33.670	1.916
March 24	Carnation	TR18	Chum	0	14	0.579	15540.000	0.264
March 25	Carnation	TR02	Chum	0	30	0.607	6.737	2.364
March 25	Carnation	TR03	Chum	0	8	0.591	947100.000	-0.817
March 25	Carnation	TR10	Chum	0	5	0.609	85.300	1.662
March 25	Carnation	TR21	Chum	0	4	0.662	1218000.000	-0.885
March 26	Carnation	TR02	Chum	0	4	0.591	34460000.000	-1.710
March 26	Carnation	TR10	Chum	0	5	0.593	20.930	2.049
March 26	Carnation	TR18	Chum	0	10	0.551	25940.000	0.117
March 27	Carnation	TR01	Chum	0	3	0.703	112.400	1.626
March 27	Carnation	TR02	Chum	0	16	0.628	349600.000	-0.483
March 27	Carnation	TR03	Chum	0	30	0.622	1273.000	0.963
March 27	Carnation	TR10	Chum	0	8	0.594	1003.000	0.995
March 28	Carnation	TR02	Chum	0	37	0.666	98.370	1.679
March 28	Carnation	TR03	Chum	0	19	0.611	1208000.000	-0.880
March 29	Carnation	TR02	Chum	0	5	0.629	5.223	2.441
March 29	Carnation	TR03	Chum	0	13	0.632	26140.000	0.160

APPENDIX XXVII CONTINUED. Chum fry length-weights from the emergence traps.

Date	Location	Trap#	Species	age	n	K	a (x10-5)	b
1989								
March 29	Carnation	TR16	Chum	0	32	0.657	6.847	2.381
March 29	Carnation	TR18	Chum	0	4	0.542	0.001	4.625
March 29	Carnation	TR21	Chum	0	6	0.685	649.200	1.144
March 30	Carnation	TR14	Chum	0	7	0.659	2812.000	0.723
March 31	Carnation	TR09	Chum	0	9	0.605	6234.000	0.531
March 31	Carnation	TR10	Chum	0	12	0.587	15.210	2.131
March 31	Carnation	TR16	Chum	0	20	0.640	0.001	4.756
April 1	Carnation	TR02	Chum	0	9	0.569	0.274	3.192
April 1	Carnation	TR03	Chum	0	3	0.632	0.002	4.565
April 1	Carnation	TR14	Chum	0	10	0.586	227.300	1.380
April 1	Carnation	TR16	Chum	0	17	0.580	2.964	2.573
April 1	Carnation	TR17	Chum	0	9	0.566	1319.000	0.942
April 2	Carnation	TR02	Chum	0	20	0.587	86.180	1.680
April 4	Carnation	TR03	Chum	0	12	0.584	1902.000	0.837
April 4	Carnation	TR09	Chum	0	18	0.579	7128.000	0.481
April 4	Carnation	TR13	Chum	0	16	0.590	618.100	1.126
April 4	Carnation	TR17	Chum	0	18	0.600	6.484	2.362
April 5	Carnation	TR02	Chum	0	33	0.569	41.020	1.866
April 5	Carnation	TR16	Chum	0	11	0.608	4.407	2.478
April 5	Carnation	TR17	Chum	0	11	0.578	133.600	1.550
April 5	Carnation	TR21	Chum	0	12	0.660	2.718	2.618
April 6	Carnation	TR02	Chum	0	7	0.587	44520.000	-0.007
April 6	Carnation	TR03	Chum	0	9	0.626	406.200	1.266
April 6	Carnation	TR10	Chum	0	4	0.585	21.440	2.030
April 6	Carnation	TR14	Chum	0	5	0.593	7.621	2.308
April 7	Carnation	TR02	Chum	0	33	0.602	34.910	1.910
April 7	Carnation	TR17	Chum	0	11	0.600	1506.000	0.915
April 10	Carnation	TR08	Chum	0	9	0.603	1472.000	0.884
April 11	Carnation	TR02	Chum	0	21	0.559	101.500	1.611
April 11	Carnation	TR14	Chum	0	12	0.635	18530.000	0.187
April 15	Carnation	TR02	Chum	0	13	0.565	62.540	1.741
April 15	Carnation	TR10	Chum	0	24	0.557	24.590	1.976
April 17	Carnation	TR08	Chum	0	25	0.578	25.030	1.989
April 22	Carnation	TR07	Chum	0	18	0.705	42.110	1.902
April 22	Carnation	TR13	Chum	0	5	0.560	38000.000	0.000
April 23	Carnation	TR02	Chum	0	34	0.579	13470.000	0.293
April 24	Carnation	TR02	Chum	0	34	0.565	11330.000	0.333
April 25	Carnation	TR02	Chum	0	11	0.565	773.500	1.055
April 26	Carnation	TR02	Chum	0	19	0.553	1.561	2.721
April 28	Carnation	TR02	Chum	0	26	0.532	325.900	1.267
May 13	Carnation	TR16	Chum	0	5	0.599	14.760	2.124
1990								
April 10	Carnation	ALL	Chum	0	13	0.584	1583.000	0.894